The Builder.

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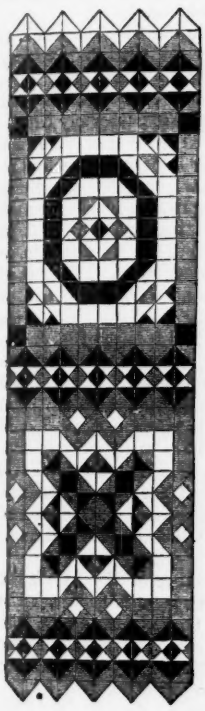


Notes on Architecture in Palestine.

IN Palestine the building epochs may be enumerated as six in all. First, the Jewish period. Secondly, the Herodian, with which head may be classed the somewhat later Jewish work of the second century A.D. in Galilee. Thirdly, the Early Christian, or Byzantine epoch. Fourthly, the Early Arab. Fifthly, the Crusading. Sixthly, the Saracenic. The modern architecture of the country is scarcely worthy of notice, and nothing has yet been found, in Palestine proper, which can be attributed to the Assyrians, to the Egyptians, or even to the Phœnicians.

1. *The Jewish Period.*

Nothing is more striking than the scarcity of genuine Jewish remains in Palestine, and the almost complete want of Hebrew or Phœnician inscriptions. Not only do no remains exist above the surface, but even by excavation nothing has been recovered except at Jerusalem.

There are, however, no indications in Scripture or in other Jewish writings, to show that the Jews, before the age of Herod, were ever a great building race. The Temple is the only erection specially noticed in the Bible, and even the Temple was built by foreign masons and craftsmen, both in the time of Solomon, and in that of Zerubbabel. The Temple is the only great Jewish building of which any remains have been found, and it is doubtful even in this case whether any of its remaining masonry can be referred back to the time of Solomon.

The various notices connected with buildings in the Bible may also be brought, in almost every case, to show that the buildings were neither magnificent nor very firmly constructed, and the same remark applies to the casual observations found in the Talmud. It seems doubtful, therefore, whether excavation will ever produce very brilliant results in Palestine as far as Jewish architecture is concerned.

The remains found at ancient Jewish sites include caves, cisterns, rock-cut scarps, and rock-cut tombs. It is evident that from an early period the inhabitants of the country were skilled in rock-cutting, and that they lived in caves, as the peasantry still do to a great extent. There are often rude tunnels cut into the hillside, from which the water of a spring comes forth. The cisterns are generally beehive-shaped, with a man-hole at the top, and from 10 ft. to 15 ft. deep. Rock-cut tanks of great size are also found at some of the old sites.

The most famous example of a rock-scarp is that which formed the foundation of the wall of ancient Jerusalem, at its south-west angle. This was bared to its base in 1874, by Mr. Maudslay, M.I.C.E., and proved to be in one part 50 ft. high. At the corner is a projection 20 ft. square, the base of a tower, with a rock-cut stair from the outer platform of rock; at the east end (as far as excavated), is a second tower and stair. Cisterns are cut in the top of the scarp, and there is, in one part, a ditch in front of it. This solid foundation for the ancient wall reminds us of the solid bases of the great towers, its Hippicus and fellows, mentioned by Josephus. Another rock foundation, 40 ft. high, exists at the north-west corner of the Haram, and this is scarped in the same way with a vertical face, rudely dressed with some kind of pick.

Fortifications of this kind are found in many parts of Palestine. The village of Bittir (Bether), stands on such scarps, partly natural, partly artificial, and the same method of defending a site is noticed by Josephus in describing Samaria.

The rock-cut tombs are, however, of yet greater interest, and a large number were planned throughout Palestine by the survey party. There is no reasonable cause for doubting their great antiquity, for the typical form of these tombs is described in the Talmud, and no examples are known which can well be ascribed to other nations than the Jews. The only Hebrew inscriptions discovered during the survey were found over the doors of these tombs, and in several cases the golden candlestick was represented on the walls. The face of the rock in which the tomb is hewn is generally vertical, but is sometimes cut back to form a square open court in front of the tomb-door. The doorway is very small, 2 ft. 6 in. or even only 2 ft. wide by 3 ft. in height. It is closed in various ways; sometimes by a stone-door, swinging on hinges, and secured by a lock, —hinges and lock having now been removed, being probably of metal;—sometimes by a slab of stone, resting against an inner rim, and secured by a horizontal bar; occasionally by a door which slides up and down; while sometimes the entrance is built up with four or five blocks. The chamber within is four-sided, ranging from 6 ft. to 30 ft. in length, and from 7 ft. to 10 ft. in height. A stone bench, about 2 ft. high and wide, often runs round three sides, and steps lead down from the door to the floor. The roof is generally flat, but sometimes cut to a low arch, or to a triangular cross section. The walls are rudely finished with a pick, or some pointed instrument, and the shape is scarcely ever truly rectangular.

The bodies were deposited in long tunnels, which run in from the walls of the chamber, and they lay with the feet towards the centre, and the head furthest in, at right angles to the wall. These pigeon-hole graves are called *kokim* (plural of *koka*) in the Talmud. They range from 4 ft. or 5 ft. (probably for children) up to 7 ft. in length, and from 2 ft. to 3 ft. in width and in height. The end opening into the chamber was closed by a stone slab, which was plastered over, and in some cases the interior was packed with chips of stone for a distance of 1 ft. or more. The roofs of the *kokim* are sometimes flat, sometimes pointed, and very generally arched out into a semicircular tunnel-vault.

It is interesting to note that in the tombs at Thebes the mummy cases are deposited in the same way as in the *kokim*, in recesses at right angles to the walls of the chamber. Thus the Jewish form of tomb may probably be derived from Egypt. An inner chamber is sometimes reached by crawling through one of the *kokim*. Niches, for lamps, are found in the walls, and sometimes in front of the entrance to the tomb as well.

Several examples were found in the plain of Sharon, in which the chamber was round, and the *kokim* radiated from it. In other cases stone pillows occurred in the *kokim* for raising the head of the corpse by supporting the nape of the neck.

There is no attempt at orientation in these tombs, which depend for direction on the rock only.

By the existence of *kokim* tombs a ruined site is shown to date back to the Jewish period. They occur at nearly all the famous Biblical sites, and their non-existence may be quoted as an objection to any proposed identification.

In the neighbourhood of ancient sites, rock-cut winepresses and rude stone towers are also found, and may probably be of equal antiquity with the tombs. The wine-presses consist of one large shallow trough, with a sloping surface, measuring sometimes 15 ft. side and 1 ft. in depth. A channel leads from this to a deeper and smaller trough, and thence sometimes to a third, 3 ft. or 4 ft. square and 2 ft. deep.

Such wine-presses are found on the hill-side above Jezreel, where perhaps Naboth's vineyard stood.

The rude stone towers appear to have been intended,—like the smaller and less solid ones now built,—to guard the orchards. They are about 15 ft. square, and rather more in height. The corner-stones are sometimes 5 ft. long, and are occasionally dressed, while the rest are quite rude. The lintel-stone of the door is also sometimes well dressed. There is no mortar in the walls, which are very thick. The roof is composed of slabs, 7 ft. or 8 ft. long, resting on the walls, and sometimes on a central pier of similar construction. In one case a semicircular arch of well-dressed stones was thrown from wall to wall to support the slabs. Six or seven of these towers will sometimes occur close together. The great size of their stones indicates their anti-

quity, as the natives never employ such large blocks in building. Such towers are noticed in our Lord's parable of the vineyard (Mark xii. 1).

Ruined oil-presses are also common in Palestine; some are circular, with a stone rolling on end; others have a couple of stone piers, with vertical grooves in them, which seem to have formed guides for a bar descending from the top. No good example has, however, been found to show the precise action of the press. Cylindrical stones also occur in connexion with these grooved piers.

In concluding these remarks as to the more ancient remains in the country, it may be noted that several small but perfect examples of cromlechs were found by Lieut. Kitchener in Galilee, and two more doubtful specimens by Lieut. Conder in Judea.

2. *The Herodian Period.*

To this period the greater part of the megalithic masonry of the Temple walls is now generally ascribed. It has been found that the curious criss-cross dressing of these stones occurs also on the voussoirs of the Tyropœon Bridge, which does not date earlier than the time of Herod's Temple. An interesting discovery has also been made recently with regard to these walls. In 1873 Lieut. Conder reached the wall at a point previously unexplored near the north-west corner of the Haram, and found the ancient masonry, *in situ*, from the rock to a level higher than that of the inner court. The appearance of the wall is shown in a woodcut in "Tent Work in Palestine" (vol. i., p. 346). At the level of the interior ground it is set back, with a bevelled edge to the stones, and piers are left projecting 1 ft. 6 in. This detail is also observable in the walls of the Hebron Haram, which Mr. Fergusson attributes to the Herodian age. The wall at Jerusalem was also found to have a batter below the level of the bevelled stones, each course being set back 6 in. behind that immediately under it. The horizontal drafts of the stones were in this part 6 in. wide, the vertical ones being 3 in. The object appears to have been to give a more equal effect to the eye. Where the wall is flush, the draft is 3 in. on each of the four edges of the face of the stone.

Scarcely any remains exist of the famous buildings of Herod, at Jericho, Antipatris, Ascalon, Samaria, or Cæsarea. It is very doubtful how much of the work at Masada is really Herodian. The Crusaders have, in the maritime cities, used up the great granite shafts of Herod's colonnades, as through-bonds in their thick walls, or to form jetties to the harbours. The pillars still standing at Samaria have lost their capitals. The shafts are 2 ft. in diameter and 11 ft. high.

Immediately south of Jerusalem, at the conical hill of Herodium, are remains of a large round building with towers, on the hill-top, and of other buildings below, corresponding in position to Herod's palace. The masonry throughout is of moderate size, very well finished, and without any draft. The vaults are semicircular in cross-section, and one small chamber had a well-built dome of fine masonry, resembling the domes of the double gateway on the south wall of the Jerusalem Haram, which Mr. Fergusson attributes to Herod's time.

The tombs of this later period are specially worthy of notice. They are distinguished from the earlier *kokim* tombs, partly by having sarcophagi under arcosolia at the sides of the chambers, instead of *kokim*, partly by the large porches with rock-cut pillars supporting their roofs. The capitals of the pillars have volutes resembling those of the Ionic order, but the attached pilasters at the corners of the porch are generally of the Doric order. The rock inside the porch (which measures 20 ft. to 30 ft. in width, by about 10 ft. in depth) is often cut in imitation of drafted masonry. Sunk places, apparently for metal tablets with inscriptions, such as the Jews employed in the second century B.C., are also found, but only one inscription was recovered, being rudely painted in red, and consisting of the Greek word ΠΑΡΘΕΝΗΣ.

A rock-cut frieze generally occurs above these tombs. The most famous example is that of the tomb of Helena, north of Jerusalem, dating in the first century B.C., according to Mr. Fergusson. In this and in many other examples there are triglyphs with guttæ, and bunches of grapes between. In one case, the doorway had a design of the Greek fret, round the jambs and over the lintel, and a rude representation of grapes and vine-leaves above. In many instances rosettes, wreaths, and geometrical patterns, very well executed, occur between the triglyphs.

New examples of very fine character were found by the Survey party, at Deir ed Derb, in Samaria, and again south of Hebron.

The *loculus* tomb, with a rock-cut sarcophagus under an arch, can now be shown to have been used by the Jews, and to be later than the *kokim* tombs. Numerous transition examples of great interest have been found. In some cases, the outer or older chamber had *kokim*; the inner or newer chamber, *loculi*. The *kokim* were often destroyed in making the *loculi*, and in some cases both *loculi* and *kokim* occurred in one chamber.

The well-known rolling stone, closing the tomb door, is almost always found in connexion with the *loculi*. Only two instances of *kokim* tombs with a rolling stone have been found. This agrees with its use in the Holy Sepulchre, which cannot have been of the class of the *kokim* tombs, as the angels sat at the head and at the foot of the grave. The stone is *in situ* in the tomb of Helena at Jerusalem, standing in the sloping groove in which it rolled. These stones weigh about 6 cwt., and are generally 3 ft. in diameter. They moved like a cheese rolling on its circumference, and had to be pushed uphill to open the door.

To the period immediately succeeding the Herodian age belong also the Galilean synagogues, of which we have now ten well-known examples, without including fragments at *Taiyibeh*, and on Carmel, at *Sufsâf*, and possibly the building at *Belât*.

The oldest appears to be the one at *Irbid* (Arbela), which is stated in Jewish literature to have been built by Rabbi Nitai, who lived 200 B.C. The synagogues of Meirûn, Kefr Birim, and El Jish are said by the same authority to have been built by the famous Rabbi Simeon bar Jochai, the Cabbalist, a member of the Sanhedrim, who lived about 120 A.D. This date agrees with the judgment passed on the architectural style of the buildings by architects, and the fact that they are only found in Galilee agrees also with this view; for at that period the Jewish Sanhedrim sat at various places in Galilee, and Tiberias was the religious centre after the fall of Bether. Rabbi Simeon built twenty-four synagogues, and the similarity of style would render it possible that the synagogues of *Kerâzeh* and *Tell Hûm* may be his work.

The synagogues have lately been noticed in the *Builder*, including that recently found by Lieutenant Kitchener. Their three main peculiarities are: first, the fact that the congregation in entering must have always turned their backs on Jerusalem, as the doors are to the south; secondly, the representation of animals on the lintel-stones, contrary to the second commandment of Moses; thirdly, the use of double columns at the corners of the colonnades.

It is worthy of notice that at Umm el 'Amed the pillars of the synagogue were 160 in. high, their capitals 8 in. high, and the bases 16 in. If the cubit was 16 in. long (as may be deduced from Maimonides), the pillars were thus 10 cubits high, the capitals half a cubit, the bases a cubit.

Among the great public works of the Herodian period may be noted the two fine aqueducts leading to Cæsarea, partly rock-cut and partly of earthen pipes carefully joined, resting on a concrete foundation in a masonry trough, and supported on fine round arches, with a double ring of voussoirs. Where tunnelled through the hill, these aqueducts are reached by winding stairs, cut in the rock, no doubt intended to facilitate the excavation of the tunnel in the first instance, and for drawing water in the second.

To rather a later period the fine Roman roads of the country, with their bridges, guard-houses, and milestones, may be ascribed. They are paved with stone in many parts. The names of the Antonine Emperors are enumerated on one of the milestones, and the lines as now traced are found in many instances on the Peutinger Tables.

3. *Byzantine Period.*

From the time of Queen Helena's pilgrimage to Jerusalem, and the building of Constantine's basilica in 333 A.D., down to the year 636 A.D., when Palestine fell into the hands of the Caliph Omar, a large Christian population spread over the country, and numerous monasteries and churches were erected, especially in the south, where large Christian villages existed, according to St. Jerome. The architecture of this period is very distinctive in style, and the large majority of the ruins now found belong to this epoch.

We have unfortunately only two dated examples of this period in Palestine itself, though in Northern Syria Du Vogüé has examined many splendid structures of the same style, some of which are dated with exactitude. In Palestine we have Constantine's basilica, built about 333 A.D., at Bethlehem, and the fortress on Gerizim, built by Justinian in 533 A.D., round the octagonal chapel erected by Zeno in 474 A.D. In the first we find columns, with capitals of the Corinthian order, having the cross on each boss between the volutes. These support a very simple cornice, and from above the columns in the central aisle rises a clearstory, once pierced with windows. The capitals are all of one design, and the columns are uniform in dimensions and detail.

In the second example we find the whole of the exterior walls, built of drafted masonry of a peculiar kind, which is found very commonly in the walls of the early chapels and monasteries. The stones are extremely irregular in dimensions, and the courses are not always carried the whole length of the wall at one level. Very narrow courses sometimes occur near the foundations, and high courses above. The stones vary from 2 ft. to 10 ft. in length, and are generally 2 ft. to 2 ft. 6 in. in height. The draft is deeper cut than that of the Herodian masonry at Jerusalem, and is extremely irregular, being sometimes 6 in. wide at one side of the stone, and 3 in. or 4 in. on the other. The boss of the stone is not always of rectangular form. The dressing is rude, and appears to have been executed with a pointed instrument. The boss is always dressed, and projects about 2 in. This masonry was evidently quarried for the buildings in which it is now found, being adapted for its present use, and occurring also in arches and lintel-stones of a size suitable to the width of the entrances beneath.

Another distinctive feature of the style is the character of the vaulting and arches. The stones are smaller than those in the walls. The keystones are very narrow, the haunch stones wide, and the intermediate voussoirs graduate in width from the one to the other.

This peculiarity is found invariably in all buildings of the period. The vaults are semicircular tunnel vaults, and groined roofs never occur, nor are pointed arches ever found.

One of the finest examples yet examined is the monastery of *Deir el Kŭlâh*, in Samaria. The cloisters remain almost perfectly preserved, with exception of the roof. The doors have flat lintel-stones over them, upon which the cross is always cut. Sometimes elaborate geometrical designs surround it, and over one door the conventional representation of Calvary occurs beneath it. Over these lintel-stones low relieving arches occur. In one case the stones above were only hollowed out, and no structural arch existed.

The masonry of the interior is not drafted, but the outer walls which rise against the face of the cliff are of large drafted masonry. In the chapel a simple cornice runs round the walls, and above the small window in the apse this cornice is deflected into a semicircular arch. In this building we thus find two of the characteristic features of the architecture of the Golden Gateway reproduced, but, unfortunately, no date has yet been found in connexion with the Samaritan example. The arches and vaults in this building reproduce the peculiarities above enumerated.

The heavy lintel-stones, 10 ft. to 15 ft. long, which were used in the Byzantine monasteries are often the only traces left of the building, the smaller stones having been carried away by the peasantry. In one case a Greek inscription was found on a lintel, which was translated,—"This is the gate of the Lord, the righteous shall enter in."

It may be noted that the vaulting of the Single and Double Gateway passages, and of the Twin Pools, and two others of the Haram vaults, show the peculiarities of the Byzantine arching, above described.

It appears that the form of tomb used at this period was the same as that above described, used in the later Jewish times, but the Christian examples are never found in cemeteries in which *kokim* tombs occur.

At *Beláa*, in Samaria, a tomb of this kind was found with the Greek inscription, ΕΙΣ ΘΕΟΣ ΜΟΝΟΣ, "One God only," and a date which appeared to be probably 332 A.D. In Jerusalem another example was found ornamented with large crosses in red paint, and the letters A and Ω at the heads of the graves. In the valley south of Jerusalem the same class of tomb is found with Greek inscriptions,—"The monument of certain persons of Holy Sion (a Church so-called) from Rome," and again,—"The excellent monument, the tomb of Amarulph of Germany."

The fine tomb, discovered in 1875 in Galilee, the façade of which is given in a former number of the *Builder* (p. 644, *ante*), is also of this period, and with two others is close to a Byzantine church. The façade is covered with a grape-vine, cut in very hard rock, having birds in the branches. On each side of the door is an illegible Greek inscription. The interior has small attached columns, with spiral fluting and rudely-cut Classic capitals. The vine is again cut on the walls, and over each sarcophagus at the back is a boss on which a cross is cut in relief. It is thus clear that the cross is as old as the tomb itself. On the side walls of the open court, before the façade, two lions are rudely represented, and two smaller animals, apparently lambs, with birds and flowers.

Careful plans, sketches, and sections of this curious monument were made by the survey party. A tomb close by has also a cross over the door flanked by two birds in relief. The town where these tombs were found is called Shefa'Amr, and was the ancient Shafram, a place where the Sanhedrim sat in the second century A.D., and which was afterwards considered by the Crusaders to be the home of Zebedee. The ancient Jewish cemetery is at some distance from the church and from the Christian tombs.

To this period also several fine structural tombs throughout Palestine probably belong, having domed roofs springing from pendentives.

The theatre and hippodrome of Beisan are also probably of the Early Christian period, being first mentioned in the time of Julian the Apostate.

4. *Early Arab Period.*

From the year 636 A.D., when Omar took Jerusalem, until 1099 A.D., when Godfrey recaptured it, few Christian buildings can have been erected.

The wooden building erected by Omar over the Holy Rock in Jerusalem was replaced, according to Mejr ed Dîn and other Arab historians, by a chapel erected in 688 A.D., by Abd el Melek, on the model of the Chapel of the Chain.

In the eighth century the town of Ramleh was founded by the grandson of the last-mentioned Caliph; but no buildings which can, by inscription or otherwise, be dated as of the period of the original foundation, have yet been discovered at Ramleh.

The early Arabs, as a rule, adapted existing buildings to their own uses (as in the Church of St. John the Baptist, at Damascus), and, with the exception of the buildings at Jerusalem, we hear very little in history of their erections.

5. *The Crusading Period.*

The most beautiful buildings in Palestine belong to the twelfth and thirteenth centuries. Many of these buildings are dated to a year, and the gradual development of style can be traced in the various example now measured.

The earliest Crusading building was the fortress of Toron, in Galilee (1104 A.D.). The churches in Jerusalem date next with that on Tabor (1110 A.D.), and the fortress of Montreal, east of Jordan (1115 A.D.). The latest work is that at Cæsarea, Acre and 'Athlit, the last strongholds which the Christians held after losing Jerusalem. The walls of Cæsarea and of 'Athlit were built in 1218 A.D. Cæsarea was restored in 1227 A.D., and the history of Crusading architecture closes with the loss of Acre in 1291 A.D.

The earliest examples of Crusading work have much of the heavy character of the earlier Byzantine. The arches are round, and are supported on large columns with capitals of Classic character, the mouldings of the cornices are of the same style, and the masonry is larger than in the later examples.

In the monastery of Ste. Marie la Grande (1140 A.D.) we find this style still in use, but some of the larger arches have a low point.

A magnificent window, photographed by the survey party, exists, close to the belfry. It has a pointed arch, and very boldly-cut dog-tooth mouldings. On the other hand, round arches are found in use even later than 1150 A.D., as, for example, at Samaria.

At Beit Jibrîn a church of St. Gabriel was built about 1134 A.D., and the north aisle still remains. The arches are pointed, but the cornice is still of the heavy Byzantine type, and the columns have capitals of classic design. It is remarkable here, and also at the church in Gaza, that these capitals are in each case of uniform design. The cutting of the leaves and volutes is in low relief, and the work, together with many other examples, seems more probably to have been executed in the twelfth century than stolen from earlier buildings. In this respect these columns contrast with the heterogeneous collection of pilfered capitals, shafts, and bases, which may be found in the Dome of the Rock, and in the Aksah Mosque.

In the later examples the arches are pointed, and ribbed groins occur in the vaulting; the heavy pillars give place to beautiful clustered columns, surrounding solid piers of masonry. The capitals are of most elegant and various design, from the smooth-leaved "crochets" at Samaria, to the deeply serrated leaves at Bîreh (1146 A.D.). The beauty of finish, and the sharpness of outline, in this later stone-work exceeds that of any other period in Palestine.

The masonry used by the Crusaders is very distinct from that of other styles. The stones in the interiors are smoothly dressed, and of small size; those in the exteriors are larger, and have rough rustic bosses. The interior work consists of stones generally 1 ft. 6 in. high, and 1 ft. to 2 ft. in length. The faces have been finished with a toothed chisel, which is often used diagonally, the dressing resembling that of Norman work in England,—a style also remarkable for the small size of the stones.

The diagonal dressing is found (though far more rudely executed) on Saracenic masonry as well as in Crusading work, and the chisel in the last-mentioned style is just as often used horizontally as vertically. A safe distinction is, however, found in the presence of masons' marks, which are peculiar to the Crusading work. Of these great numbers have been collected, including many designs commonly found in English buildings of the same time, and all the letters of the alphabet except D, Q, and X.

The same mark is found in buildings separated by the entire length of Palestine, and in churches built at an interval of fifty or sixty years. In the larger and more important buildings, the variety of marks is much greater. In the church at Bîreh, an arrow-head is the only mark found, and this is repeated all over the walls.

The exteriors of the fortresses have stones 2 ft. to 6 ft. in length, and about 2 ft. high, with a deep draft, and a rustic boss entirely undressed, and sometimes projecting nearly a foot. In two cases (at Sôba and at Kolônia) the draft has a diagonal dressing with a toothed chisel. At 'Athlît (1218 A.D.), the voussoirs of a pointed arch over a postern are of drafted rustic masonry. In the *Kŭlât Jalûd*, at Jerusalem, a pointed arch exists in the interior, with drafted stones, having a smooth boss.

From these examples, as well as from many others in Galilee, Syria, and Cyprus, it is clear that the drafted stones were specially quarried by the Crusaders, and were not, as some have supposed, taken from more ancient buildings of Jewish or Phœnician origin.

Some of the ruins of the period may also be recognised by the peculiar character used in the inscriptions, which has been fully described by Du Vogüé. Thus, the fine old monastery of *Kusr Hajlah*, near Jericho, has on its walls frescoes with such inscriptions, by which it is dated as not earlier than 998 A.D.,—a result which agrees with the pointed arches, and diagonally-dressed masonry found in the ruins.

Many of the Crusading buildings have also *graffite* in red paint, with dates of the thirteenth and fifteenth centuries.

The thirteenth-century fortresses (as at Cæsarea) are remarkable for the sloping scarps, with very small masonry in extremely hard cement. These sometimes cover the large masonry of the older vertical walls.

The tombs of the Crusading Period are also distinct in character. The rock-cut cemeteries near Crusading sites have shafts sunk in the flat surface, measuring about 6 ft. by 3 ft., and 5 ft. or 6 ft. in depth. On each side of this shaft a recess is cut, under an arch, so that two bodies lay parallel, one on each side of the shaft; a single block of stone covered over the shaft.

These tombs are called *Frank* tombs by the natives, and seem to have been intended for a man and his wife. One example, found at Jerusalem, contained leaden coffins with crosses in relief on the lids. In another case the inscription cut at the back of one of the loculi was as follows:—+ MIMOPIN + ΓΕωΡΓΙΟ. The crosses showed it to be Christian, and the irregular size of the letters, with the barbarous Greek, seems to date it as belonging to the Crusading period.

6. *The Saracenic Period.*

The principal Saracenic works are mosques and khans; but the times subsequent to the Crusading were not remarkable for the number of fine buildings erected. At Ramleh the beautiful White Mosque was built in the fourteenth century, and another mosque at Yebnah is dated by its inscriptions about the same time. In Galilee we have some small fortresses of native architecture, and at Acre the mosque of Jezzar Pacha. In Gaza and Hebron there are also mosques built after the expulsion of the Christians, but in the time of Saladin the Christian churches appear to have been used as mosques, and thus the number of original buildings intended for Moslem worship is small.

Saracenic architecture is remarkable for its pointed arches, with voussoirs sometimes of even number, sometimes uneven, the keystone being cut out to form the point. The masonry is less beautifully dressed than that of the Crusaders, and generally of larger stones. Masons' marks never occur. The ornamentation consists of geometrical designs in low relief, and appears very timid in contrast with the fine bold sculpture of the twelfth century.

THE PROGRAMME OF THE STUDIES OF THE ARCHITECT AND OF THE CIVIL ENGINEER.

The programme of the International Congress on Civil Engineering, lately reproduced in our columns, is not one that we can regard with entire satisfaction. As to its merit as a compendious catalogue of the exhibits or contributions of any kind brought before the Congress, we have nothing to say. But we are entitled to expect that a document of this nature should form a sort of skeleton outline of the science of engineering. As such, especially when drawn up with the lucidity of phrase and systematic order which for the most part characterise French scientific works, such a paper might form a contribution of no little value to the science of higher education. As it is, however, the gaps and blanks are almost as conspicuous as the features illustrated. Thus, there is a head, "*Téléyraphes pneumatiques*," but not a word as to the electric telegraph, or those wonderful methods now in process of daily improvement, by means of which the electric fluid is employed for the purpose of giving sonorous signals at a distance; or, in the words of Mr. Spottiswoode, electricity is converted into sound. Again, there is a heading "*Inondations: Moyens à leur opposer*," but not a word as to the first essential for carrying out any of these methods, the hydraulic survey of the district liable to the floods. Indeed, the whole question of survey, the very ground-work and basis of civil engineering, is omitted from the French programme.

We hold that a positive injury is inflicted on scientific education by the setting forth of partial details as if they constituted the whole of any branch of study. The tendency of the age is to run into detail. The division of labour is a means of acquiring intellectual, as well as physical, wealth. But the danger of losing sight of the whole in elaborate detail of the parts is great and urgent. Unless the general form of a science or art be kept clearly before the attention of its students, they not only sink into mere specialists, but work in their special branches of study with less advantage than would be the case were their ideas enlarged, so as to appreciate the relation of their particular work to the general advance of the study of which it is an integral part.

We have been very much struck, within the past few weeks, with examples of the mode in which this specialisation of attention appears to have cramped and injured the *coup d'œil* of the architect. It is unnecessary to indicate locali-

ties, further than to say that we speak of a part of the country where pure air, noble prospects, good roads, and comparative sparseness of population are such as to present unusual inducements for the erection of private residences of a high class. Beautiful specimens of old English architecture stud the country, from the cottage and the farm to the baronial or knightly mansion. Men are found to understand these advantages, and to avail themselves of their existence. Money, it is certain, is forthcoming with an unstinted hand. A sort of paradise is open to the architect.

Yet here we find houses rising at costs varying from 1,500*l.* to 15,000*l.* or upwards, the inspection of which, as their plans gradually define themselves in brick, and stone, and mortar, serves to announce the absence of the architect—using the term in its highest sense. It is not that we have to complain of scamping, or of slovenly work. Quite the contrary. The details are often admirable. But the faults that we lament are the want of grasp, of breadth of plan, and of adapting the methods of the builder to the special circumstances of site. Here is a house that we might take as a model in many respects, with the stable-yard crammed—quite unnecessarily—so close to the main entrance as to shut off the garden view, and promise anything but salubrity to the reception-rooms, if the stud be more than a cypher. There we see three or four houses, each, may be, of some pretension to comfort and elegance, stuck so heedlessly in one another's light as to form an ill-adjusted block, where there might have been a picturesque and self-contained group of residences. In another place we see a road so diverted as to cram one house into an ill-shaped triangular garden, commanded by two roads, while the attempt to obliterate the old road by the simple process of planting, without any reference to the rules of landscape or other gardening, has brought a bit of irredeemable Cockneydom into what was a little while since an elegant and picturesque country road. In another place, where at least from 15,000*l.* to 20,000*l.* must be in course of expenditure, where the site commands a magnificent view, and where the preparations for a terraced garden denote a great freedom from any narrow ideas as to cost, we find, rising in the air, instead of a noble mansion, a heterogeneous collection of rooms. A Gothic archway, that might serve for a church, opens into a little insignificant low vestibule, which entirely destroys the *raison d'être* of the gateway. Where a noble oriel window ought to command a broad and diversified view, a chimney is placed, with a small square glazed aperture, called by courtesy a window, on each side. By the doorway, a shapeless window, which looks like that of a buttery, is intended, by some strange caprice, to light a studio or drawing-room. All the details are admirable. No doubt some good examples may be cited for every mullion, every moulding, perhaps every room. But whole there is none,—only a jumble of parts,—and of parts that are petty and inappropriate, when the situation demands the simple and the grand.

Now we cannot doubt that an architect who, at the same time has so much and so little of what is required for excellence in his work as the author of this design, must be a sufferer from a want of that comprehensive, systematic, subordinated programme for his work, the want of which we lament in the Paris programme. Given a site of unusual beauty, and far-reaching view, the first duty of the architect should be so to arrange the chief rooms, and especially the windows, of the house as to take this view as much as possible within,—to make it an unrivalled furniture of the reception apartments. Secondly, we might suggest, the idea of making the edifice a consistent and graceful pile of buildings, as forming part of the view from neighbouring heights, should not have been forgotten. But to make use of such an opportunity for the sole purpose of reproducing Elizabethan mullions, thirteenth-century arch and mouldings, and quaint little windows out of which no one can look, is,—in our view of the case,—not only to waste money, but to sacrifice reputation.

With this view we will attempt to sketch out something of a rough programme of engineering study. Our work must be, necessarily, tentative and provisional. But those who may mend it, not by the criticism or the addition of mere details, but by giving a greater roundness, completeness, and system to the whole, will deserve well of their professional brethren and pupils.

The business of the engineer, then (to return to the Paris programme) contains three main divisions or provinces. These are (1) survey; (2) physical engineering; and (3) mechanical engineering. The head of special or unclassed studies may be added, provisionally, to include those pursuits which are in the course of rapid development, or which have not as yet been sufficiently advanced to be relegated to their appointed stations in the completed system of scientific order.

Survey is the basis of the whole science of engineering. It is either general or special. It ranges from geodesic operations of the first magnitude to the careful exclusion of a bit of sappy timber from a bridge or a door. The antiquity of the work of the surveyor has very recently been illustrated in an unexpected manner. An Assyrian tablet, in baked clay, has just been translated for our pages. It is a deed of sale of a plot of ground, and a plan of the ground in question is attached. This most ancient land survey is more than 2,000 years old. Had the plans of Rome, which were engraved on marble, been copied in terra-cotta, we might at this moment have a more accurate knowledge of the ancient topography of the Eternal City than we have of London in the time of the Conqueror. But it was not till the end of the last century that a trigonometrical survey was generally allowed to be the only accurate basis for mapping a country. General Roy began the trigonometrical survey of Great Britain by measuring his famous base on Hounslow Heath in 1784. In 1802, Major Lambton commenced the mathematical and geographical survey of India by measuring a base-line near Madras. Sir George Everest extended Lambton's "great arc series" across the plain of the Ganges, to the foot of the Himalayas; and when the vast peninsula had been covered with a gridiron of triangles, and a second base was measured in the valley of the Debra Dur, the difference between the computed and the measured length was only 7 in. The height of the loftiest of the Himalayan peaks, named, in fit tribute to the great surveyor, Mount Everest, was determined by measurements of angles by the great theodolite as 29,002 ft. above the sea.

Survey, then, forms the first part of the programme of the study of the engineer. It includes geodesic survey proper, or triangulation, with astronomical determinations of salient points; geographical and topographical delineation; orography, or the contours of the country; geological survey; hydrological survey; and hydrography, or preparation of charts of coasts and estuaries, including soundings and determination of tides and currents. Land survey is an important detail, subordinate to topographical delineation. The shading of hills and delineation of water-sheds, with the preparation of physical maps, ranks under the head of orography. The survey of buildings, and of quarries, mines, forests, and other sources of materials for the engineer and the builder, carries the duties of the surveyor to their limit of detail. We have not spoken of the pioneer surveyor, whose duty, though important, is only provisional.

Each branch of physical engineering is properly based on a branch of survey. The first call upon the engineer is for the establishment of communications. For this purpose, when the first stage of rough work is passed, the orographical and topographical surveys furnish the data. Communications at present are divided into national and international, or exterior and interior; divisions which partly, though not wholly, correspond with that of communication by land or by water. For the former, the engineer has to study the formation of roads, pavements, tramways, and railways; for the latter, he has to provide ports and harbours, to cut canals, and to systematise rivers.

The provision of internal waterways is closely connected with other branches of hydraulic engineering, based on hydraulic survey. Among them are drainage and irrigation, — a study which requires for its completion the survey and regulation of forests and plantations. In the second place ranks the provision for the water-supply of urban districts, and, generally, of the population of the country. Inseparable from the water-supply question is that of sewerage, including the disinfection of its effluent water. Agricultural engineering must be considered in detail under a separate head, but is deeply affected by the system adopted for irrigation and drainage. The details of earthwork, masonry, timber, ironwork, and other element of construction, may be grouped together by the writer or lecturer, but will be studied practically by the pupil as they are carried out on the different public works of which the main characters are above indicated.

Mining, quarrying, coal-mining, well-sinking and boring, form a separate branch of study. It is related, on the one hand, to forestry and woodcutting; and, on the other hand, to metallurgy, smelting, and the making of iron and steel. The civil here comes into immediate contact with the mechanical engineer, whose cradle and school are found in the vast establishments which add forges to furnaces, and not only cast, roll, hammer, and forge, but also, turn, bore, and plane, vast and complex objects of metal.

As the physical engineer gives his hand to the mechanical, so does the latter need much of the knowledge of the chemist. The study of heat has been usually regarded as a part of physics; that is to say, of that *remanet* of natural science which has not yet been portioned out under the name of a special study. But while, on the one hand, the study of heat, as far as its production and its metallurgic effect are concerned, is a part of industrial chemistry, the determination of the relation of heat to motion, which is one of the grandest strides of recent science, renders the study of caloric a distinct part of mechanics. The English thermal unit,—called after the name of its discoverer, Joule's equivalent,—determines the equality of the energy required either to raise 772 lb. for a foot, or to raise the temperature of 1 lb. of water by one degree of Fahrenheit's scale. This elevation of temperature in a pound of water can be produced by the consumption of half a grain of carbon. If water descends freely through a distance of 772 ft., it acquires from gravity a velocity of 223 ft. per second; and if suddenly brought to rest when moving at this velocity, would be violently agitated, and raised one degree Fahrenheit in its temperature. So intimately connected are chemical, thermic, and mechanical phenomena.

The study of mechanical engineering may be described as regarding, in the first instance, the application of natural sources of motion. These are water, wind, and animal power, to which the ingenious labours of Capt. John Ericsson have enabled the engineer to add the radiant heat of the sun.

The readiness with which the force of gravity can be utilised by falling water was perhaps one of the first discoveries in mechanics. The origin of the water-wheel is lost in the remoteness of antiquity. Still more ancient, no doubt, were the simplest contrivances employed, and to this day in use in India, for raising water for the purpose of irrigation. The construction of water-wheels,—over-shot, breast, or under-shot,—of turbines, or of any other apparatus for utilising the mechanical force of a fall or current of water, is falling into neglect in our densely-peopled country. Certainty in command of power is even more essential to the owner of a large mill or factory than economy; and steam is displacing water as a prime motor for that reason. This is not, however, the case in America, in Italy, or in some other localities, where the water-mill is still a very important care of the engineer. In Great Britain, the disuse of water as a prime mover is likely to be fully made up for by its constantly-increasing use as a transmitter of motion. The accumulator principle is one likely to exercise very wide development. Hydraulic rams, presses, gun-carriages, and second motors of all kinds are daily in course of new application. And the pump, with all its numerous applications, may be studied under this branch of engineering.

The service of wind as a motor power is falling still more rapidly into disuse than that of water. Long lines of windmills may still be seen pumping night and day, whenever there is a breath of wind stirring, to drain our eastern lowlands and fens; but the windmill is becoming more and more rare as a feature of English landscape. That use of the wind which, half a century ago, was one of the proudest peculiarities of the Englishman, whose insular home made him so often a born sailor, has received a last fatal blow from the opening of the Suez Canal. On the China trade, until that great waterway was opened, the sailing clipper ships competed successfully with steamers; the former passage occupying from 90 to 100 days, as against 75 to 80 days for the latter. On this well-known sea-path the course of the winds could be very clearly anticipated. But ships

now run on the Australian line which perform a voyage exceeding 12,000 nautical miles, at an average speed of 11 or 12 knots, and consume only 1,500 or 1,600 tons of coal to drive a weight of 6,000 to 7,000 tons from port to port. Very few sailing vessels of any size are now building; and it is only the yachtsman or the fisherman who is likely long to spread his sails to the wind.

The use of compressed air, as a communicator of motion, however, is advancing together with that of water. The ingenious effort made some thirty-six years ago to avoid the great cost of the self-traction of the locomotive by a pneumatic apparatus, failed, not from mechanical, but from physical causes. As soon as the air in the tube was rarified by the action of the air-pumps, the heat of the earth rushed in, and restored the tension. Thus, the South Devon engines were at work, not only in drawing trains, but in pumping heat out of the earth; and they became almost red-hot in consequence. The use of air as a secondary motor is in its infancy. In some cases, as in mining and tunnelling, highly compressed air performs the double function of moving the perforators, and of ventilating and cooling the works by its escape. It is probable that the employment of compressed air will hereafter receive a great development.

As to the use of animal power, the great object of the engineer at the present day is to dispense with its employment. Among the earliest steps in civilisation may be reckoned the attachment of the bullock to the plough; and, much later, that of the horse, not only to the plough, but to the wagon, the boat, and the coach. The entire period comprised in the history of the application of animal power has witnessed an increase in velocity of work or of transport, from about one mile and a third to sixteen miles per hour. The former is the pace of the bullock in the plough; the latter rate of progress, that of a horse at the fastest trot, was attained by some of the fastest of the English coaches forty years ago. One great disadvantage of animal power is that its cost increases rapidly together with the speed attained. It is not the work done which is the limit of expense; but the wear and tear of the animal tissues. Each creature has its natural pace, or rate of movement; and the most rapidly-moving are also the lightest animals, and those least adapted for performing mechanical work. With machinery the reverse is the case. Speed, in machines, is a great element of cheapness. A machine driven twice as fast as another may do twice as much work in the same time; and although the consumption of fuel is proportioned to the work done, much of the other expense will be proportioned to the time occupied in doing it, so that the financial saving becomes considerable. Indeed, if experiments described in the *American Journal of Science and Arts* may be relied on, certain kinds of friction, such as that of journals, decrease with an increase of speed in the revolution of the machinery; a speed of surface revolution of 1 ft. per minute giving 15 as a co-efficient of friction, and a speed of 100 ft. per minute giving a co-efficient of only five. This diminution of cost accompanying increase of speed is an element which tends to the entire displacement of animal by mechanical moving power. It substitutes the steam-engine, or the caloric-engine, for the bullock or the horse, as the slave of man. Little by little it will extinguish the labourer, or the uninstructed man who derives his pay from the sheer exercise of muscular strength. Not a year passes without the substitution of mechanical power for human labour in some new field. The revolution thus in progress is one of more moment than any that the world has yet witnessed. Very long was it stoutly resisted,—and resisted by the very men whose position, it may be hoped, will be elevated by the removal of the burden of toil from their shoulders. This fierce opposition has of late slackened, if not ceased, in this country. It is now rather felt to be the case, very often, that necessary work is shirked, or grudgingly performed, than that the labourer insists on his monopoly of toil. We here touch on a question in which the functions of the engineer bring him into contact with the statistician, with the statesman, and with the philanthropist. But while in newly settled countries, and in sparsely peopled districts, human muscles, and the ready service of the bullock, the horse, the ass, and even the llama, may long retain their present importance as prime movers and sources of power, there seems every reason to anticipate that neither water, wind, nor animal power will be employed as prime movers, except under rare and exceptional cases, in the engineering of the future. To one great exception, however, we have by-and-by to allude.

We cannot do justice to the subject without returning to its discussion. But in closing for the present, we cannot omit to express lively satisfaction at the manner in which the appreciation of the importance of exhaustive and systematic programmes is evinced by the first speaker at the meeting of the British Association. The address of the president is one of which every Englishman may feel proud. Mr. Spottiswoode's tacit protest against a professedly positive, but really negative, attempt to draw a hard-and-fast line to what is to be known, will receive the support of every worker in science, as contrasted with the dreamers in philosophy. Professor Ingram, in his apology for political economy, has taken up our own position,—"That the study of the economic phenomena of society ought to be systematically combined with that of the other aspects of social existence; that the excessive tendency to abstraction and to unreal simplification should be checked; that the *à priori* deductive method should be changed for the historical; and that economic laws and deductions from them should be examined, and expressed in less absolute form. Nor must we omit, in calling attention to the accordance between the views we have long maintained and those now authoritatively put forth at Dublin, to congratulate the president of the Mechanical Sciences Section, Mr. Easton, C.E., on his advocacy of our own proposal, several times urged, for the creation of an administrative department, "charged with the duty of collecting and digesting for use all the facts and knowledge necessary for a due, comprehensive, and satisfactory dealing with every river-basin or water-shed area in the United Kingdom."

THE ST. NICHOLAS ASSOCIATION OF ABERDEEN.

We have received two pamphlets, containing the speeches and resolutions at a meeting held at Aberdeen recently, for the establishment of the Association above-named, and the constitution and rules thereof. As representing a movement which may very well be extended to other towns which are even more in want of it than Aberdeen, the subject has more than a local interest.

The general object of the Association,—called after the "patron saint" of Aberdeen,—is stated in the second clause of the constitution to be "the initiation and encouragement of efforts,—(A) to protect and advance the amenity of the city of Aberdeen and its neighbourhood; (B) to preserve objects of antiquarian, historical, or artistic interest in the city or neighbourhood; (C) to promote the means of open-air recreation for its inhabitants; and (D) to support the magistrates and town council in their endeavours to attain these objects." The rules proceed to give details of the constitution and method of operation of the Association, providing in the usual way for ordinary and special meetings of the council for considering suggestions and special cases that may come within its scope; the extent of the active operation contemplated being mainly indicated in the clause stating that the council will be expected to use its influence with the city authorities, and with proprietors, builders, and others, whose co-operation would be useful in practically carrying out the objects of the Association.

What is the feeling which has prompted the formation of the Association, and in what way its ends are proposed to be accomplished, we learn better from the interesting report of the meeting at which it was constituted, at which the remarks made by some of the speakers showed a great deal of sound sense and judgment, and suggested ideas worthy of consideration by other towns. Mr. John F. White, who presided on the occasion, after observing that the moral and material interests of the town were being well cared for by numerous societies, said that there were still interests that had been overlooked, and a duty to be attended to, that of starting an association which should have for its object to do what is possible to increase the amenity and beauty of the town, and also to provide as far as possible healthy and rational out-door recreation for the inhabitants. The expression "amenity" is rather happily chosen to express the kind of improvement which is desired,—more so even than those who have thus used it seem aware; it is not so much "an old English word" as one speaker said, but an old French word derived from Latin, and subsequently adopted into English, and referring especially, in the first instance, to the pleasantness of places and scenes more particularly. The chairman, in continuing his remarks, said,—

"If we cannot claim such high grounds for public consideration as some of those philanthropic institutions to which I have referred, yet when we consider that our aim is so lofty as to seek that the life of the poorest inhabitant shall be made sweeter and happier, and that our object is also to elevate the tone of the whole community by providing healthy out-door amusements, I do not think it can be said that our object is an unworthy one. We all know how much, as individuals, we are influenced by the circumstances in which we are placed, and how much our happiness is increased if the lines have fallen to us in pleasant places. If this is true of the individual, it is certainly not less true of a community, and so when we turn to our own large cities we cannot fail to be impressed with the depressing and disheartening circumstances and conditions under which the great majority of our fellow townsmen live. It seems to me, then, doubly the duty of every town and community to do its best to provide pleasant surroundings for the benefit of those who are unable to make their homes attractive and cheerful; to let the poorest inhabitant feel that everything that can be done has been done to make his life more tolerable and enjoyable, and to give him interest or proprietorship in every object of beauty the town can supply."

These are very good words; nor do we believe there is any want of goodwill to back them on the part either of the speaker or of others in Aberdeen who are taking up the movement thus initiated. The two questions which seem to have presented themselves most prominently in regard to the working of such a movement at Aberdeen, were the relation of the authors of it to the governing body of the city, and the nature and extent of the natural advantages for carrying out improvements and "amenities." In regard to the first point, there seems to have been a doubtful feeling running through the whole proceedings, as to what the municipal authorities would think of it,—an attitude of compliment to them, as of course enlightened people who would be only too glad to be helped in making improvements of every sort, coupled with an underlying conviction that municipal government was in reality disposed to neglect such matters, and required some spur from without. But the fact is, that official bodies hardly can deal with subjects connected solely with the artistic side of town life. As another speaker, an architect (Mr. Mackenzie), observed, there is not (and we may add there hardly can be in any such case) any power on the part of official authority to condemn, for instance, ugly buildings as such. They can make rules about line of frontage and such matters, and enforce their observance; but to go further than this would be to constitute themselves a committee of taste,—a very uncanny sort of institution under any circumstances; or they may employ a professional man of taste,—in other words, an architect,—and lay down a rule that all designs for new buildings are to be submitted to his approval, in regard to design as well as construction; a still more objectionable state of things, which, if carried out logically, would simply result in all buildings being designed to suit the taste of the town architect, and designs condemned for no other reason than that they were in a style which did not meet his approval. We have known something very like this carried out by a strong-willed architectural official; and how undesirable such a state of things is there is no necessity to point out. This kind of object, the improvement in the outward adorning and artistic treatment of a town, can only be attained by a general and gradual improvement in public taste, leading to a demand for better things, and a less easily satisfied spirit of public criticism; and to this end a non-official society, such as that we are alluding to, may do good work; not by captiously criticising everything that does not suit the taste or theory of its members, but by taking every opportunity to bring before public notice the importance of the beautiful side of things, by calling attention to opportunities overlooked or misused, or protesting against any open and flagrant perpetration of ugliness or disfigurement. Except when the case becomes flagrant,—when something is proposed which in the eye of every educated person is an obvious Vandalism,—it is probable that a society such as this will be more really effective in the end by aiming chiefly at generally educating public taste, than by interfering in detail and in an official manner. It was observed by one speaker at the meeting that Aberdeen had to lament daily "the

fearful atrocities perpetrated in the way of buildings." This is a strong expression, and as far as we remember, Aberdeen has on the whole less to complain of in this way than many towns. But let the arhitectural "atrocities" be ever so bad in the eyes of competent critics, what individual or what body of men are to take on themselves to draw the line between beauty and ugliness, and to say of a particular design, "This is too ugly,—we cannot allow you to build this; take it back, and make it beautiful?" Such a principle would result at the best in absurdity, at the worst in a kind of petty tyranny. If a man building on a large scale shows a culpable and determined disregard to the appearance of his structures, the Association may, as the phrase is, "make it hot for him," by bringing to bear on him (with more weight and concentration) the same kind of criticism which is generally fired off through the public press; but further than this they could hardly go with effect.

Some of the suggestions for the treatment of Aberdeen and its environs which were made are interesting as bearing on the general question of the relation between art and nature in the laying out or improving of towns. The chairman on the occasion rather dwelt on the desirability of improving the access to places of picturesque character in the outskirts of the town, than of making the picturesque deliberately. Mentioning the various beautiful surroundings of the town, the links, the downs, the splendid stretch of sands, and other places where beauty and healthfulness were provided by nature, he said,—"If we had proper accesses,—avenues, if possible, planted with trees,—leading to these fine surroundings, we should have a result worthy of the town." In regard to one of these "pleasaunces," the sea-beach we remember being struck with the deficiency alluded to here. Few towns can have a finer stretch of sea-shore within easy distance from the streets than that between the mouths of the Don and the Dee, where the sea comes in gloriously in a high wind; but seldom have we found so much difficulty in getting to the sea when so near it. Sheriff Wilson suggested that the waste and marshy expanse of land between the two rivers should be made into "a great marine park": a very fine and enterprising idea. In a general way, we should be very cautious about attempting to substitute artificial landscape for the wildness and comparative barrenness which is almost characteristic of coast scenery in most places in the higher latitudes; but the particular expanse of land referred to is so utterly without interest or beauty that there can hardly be any question as to its artificial treatment being an improvement. But besides it must be remembered that a modern town is essentially an artificial, not a natural product; and must be more so than ever now that the sanitary arrangement of towns is so much more thought of than it has ever been before, and it is next to impossible that they can be again left to "grow" in any picturesque irregularity which chance may determine. Regarding the matter in this light, we were pleased to notice the phrase made use of by another speaker in the course of the discussion, that he hoped to see "a large work of art" shortly carried out on the banks of the Dee, in the shape of a promenade and carriage drive. The speaker was an architect, and therefore perhaps with an acquired tendency to look at things from an artistic point of view. But there is no question that is the right way to look at it: a town and its environs should constitute "a work of art" on a great scale. And this is the real reply to those people who, allowing a sentiment for the past (a beautiful feeling in itself) to override every other consideration, complain of every improvement which substitutes a straight street for a crooked one, or interferes with the picturesque but often unhealthy tumbledown architecture of old nooks in old towns. Critics of this order would very likely have wanted to stop a town such as Aberdeen in its first great improvement, the making of the long central street (Union-street); they would have protested that it was a spoliation of the old features and character of the town; and so in a sense it was. Aberdeen in its old days was, like most old towns, a work of nature, *i.e.*, of human nature unassisted by science or art; and, from what is left now, we may judge that it was as dirty and unhealthy as such towns usually are. The making of Union-street was the first step towards turning the city into a work of art, and that is the basis on which its further improvements have now to be carried out. The great difficulty and the real success in such a case consists in so blending the artificial outskirts with the natural features of the country that there shall not be any harsh line of demarcation between them; that the town and its environs should appear to arise naturally out of the surrounding landscape; the art in this case being only an application on a larger scale of that which is exemplified in designing a country-house with ornamental grounds.

That such a movement has been set on foot in Aberdeen is matter of congratulation, the more so as it seems to be planned with moderation and common sense. In speaking of the preservation of old buildings, for example, the Chairman pointedly said that no one should allow his own feeling for such monuments to stand in the way of sanitary improvement,—a piece of common-sense which a certain other society would do well to ponder. In connexion with this subject a very valuable suggestion came, it appears, from an able Scottish artist, Mr. G. Reid, R.S.A., who thought the St. Nicholas Association should charge itself with the task of having careful drawings made of old buildings as they exist at the present time, and backed his recommendation by the offer to give his own assistance in doing this very desirable work.

We have given a little space to commenting on the inauguration of this Association for the Promotion of the Æsthetics of Aberdeen, believing that such a movement may not improbably be taken up in other towns, and desiring that it may be, provided always that the line of fair and right interference is not overstepped, and that such associations are not allowed to degenerate (as they sometimes do) into cliques of persons anxious only to recommend or, practically, to force their own views and tastes upon the rest of the community. In Aberdeen there seems to be every wish to avoid this, as it was particularly urged that the association should be made as extended and comprehensive as possible.

It may not be generally known that an association having just the same objects was started a good many years ago in London, but did not remain in operation long.* We want something of the kind sadly now, when these matters are practically in the hands of such a body as the Metropolitan Board of Works. The Institute of Architects is supposed to keep an eye on the doings of that Board in respect of one of their undertakings, but it requires a body embracing wider interests and representing society more comprehensively, to produce much effect.

SANITARY REFORMERS AT PLAY.

We mentioned that three days were devoted by the members of the International Congress on Hygiene, held at the beginning of this month, to excursions in and about Paris, and these were the more pleasurable as they afforded their French hosts an excellent opportunity for displaying their talents as organisers and their virtues of hospitality. The first of these days was spent in a visit to the École Monge in the morning, to the Menilmontant Hospital in the afternoon, and the day was concluded by a grand banquet. The École Monge is, perhaps, the most perfect educational institution for youths in France. The sanitary details are under the management and superintendence of Dr. Passant, and are worthy of the warmest commendation. The dimensions of the class-rooms allow 20 cubic mètres for each pupil. The walls of the dining-room are enamelled, so that they can be washed with a profusion of water. The pupils are constantly drilled into washing their hands and persons. The closets are in a separate block, away from the main building, and a constant draught is created, by means of a shaft and gas-burner, which passes under each pan, and prevents any sewer-gas ascending into the closet and adjacent school. An isolation infirmary has been provided. The dormitories are marvels of cleanliness, and there are adequate provisions for physical exercise in the open air, even when it rains. Finally, the food is plain, ample, and of nutritious quality. The organisation of the school is unfortunately the exception and not the rule, and the foreign delegates will have a very false idea of French sanitation if they imagine that most of the other educational establishments are constructed according to a similar model. The same may be said of the Menilmontant Hospital, which, though open to many criticisms, is, nevertheless, a good institution when compared with a great number of other French hospitals. Indeed, it is questionable whether it was altogether fair to take the foreign delegates solely to these model and totally exceptional institutions. The hospitals of Paris are a disgrace to the nation, and most enlightened French practitioners would have welcomed the moral pressure which the foreign delegates would have brought to bear had they been allowed to visit these seats of infection. The complaints of Frenchmen have been disregarded for many years; but if these social sores were exposed to all Europe, perhaps wounded national pride would awake the administration to a keener sense of its duties. It is incredible that in many hospitals cases of smallpox, scarlet fever, and diphtheria, are not isolated; that in the few places where isolation is practised it is most imperfectly carried out, and that, in many instances, there have been more cases of fever engendered within the hospital,—that is, contracted by patients suffering from some other complaint,—than there were cases brought in from the outside. All these points were, however, kept in the background; and if the delegates are to judge the sanitary condition of France from what they saw during the three days' excursion, they will have a thoroughly false notion of the condition of the country.

These considerations did not prevent the outburst of the most lavish praise during the grand banquet. Some 250 delegates sat down to table, and one and all applauded the greatness of France and the French people. Indeed, it was impossible to resist the eloquent words of welcome pronounced by Professor Gubler, who, as the president of the congress, drank to the foreign delegates:—

"I call you colleagues," he exclaimed, "but I should say brothers, for where can that rare plant, the flower of fraternity, bloom and blossom better if not in our midst, and at a congress of health? Here we have no jealous rivalries, only a generous emulation for the attainment of that which is good. We wage war against all abuses, against all causes that bring about results injurious to our fellows, and with such principles the sentiment of fraternity will naturally dwell in our midst. I drink, therefore, to our foreign colleagues, and specially to the delegates of their governments and learned societies, which are as emanations from other peoples, as the warm sunbeams of their sympathy shining on us. I also ask your permission to drink a personal toast in honour of the Nestor among the hygienists of Great Britain, in honour of Mr. Edwin Chadwick, one of the most illustrious representatives of the science we cultivate."

In returning thanks, Mr. Chadwick spoke of the importance of creating a ministry of public health, and based his arguments on the fact that Lord Beaconsfield had once declared that the preservation of the health of the people should be a prime minister's first duty. The Russian delegate, Baron Maydell, rose as the representative of all the foreign delegates, not to say anything new, "for in Paris it would indeed be difficult to say anything new," but to repeat once more that science could not be restricted by frontiers.

"Science,—that virgin eternally young and chaste, though the mother of thousands of children,—science has equally developed and nurtured us all. It is by the milk drawn from her breast that we have fraternised and acquired strength, and we reject all artificial foods, for they are the true cause of all physical and moral rickets."

Baron Maydell then drank to the health of the nation so "fertile in great geniuses, so amiable in its social intercourse, and which now offers so wide a hospitality: to the health of the great French nation."

The Roumanian delegate thanked the French nation for the many Frenchmen who had helped to civilise his own country, and for the good education many Roumanians had received in France.

The American delegate, Dr. Richardson, of Philadelphia, represented the American Republic in the good wishes she bore to her sister, the Republic of France. As the youngest member of the oldest university of the New World, he thought that this happy combination of the Old and the New uniting together might forecast a good future for hygienic progress.

With such sentiments the magnificent banquet

* The late Mr. William Hickson, of the *Westminster Review*, was the originator, and the conductor of this journal was, at first, the honorary secretary.

concluded, and this brilliant scene, combined with unbounded cordiality, will not readily be forgotten by those who participated in the joyous concourse.

Similar speeches were uttered at the open air lunch given by M. Menier to the members of the Congress who visited his great chocolate factory; inspected his model cottages, rented to his workmen for only 150 fr. per annum, and enjoyed the sight of all the factory children learning in an excellent school built exclusively for their benefit, and where gratuitous but compulsory education is given. The sewers of Paris and the peninsula of Gennevilliers were the points of interest in another excursion, and both proved greatly instructive.

Finally, after the Congress was all over, the foreign delegates gave a breakfast to the president, the secretaries, and the authors of the reports who had organised this sanitary international parliament. This last gathering was a great success, and due in a great measure to the active initiative of Dr. Faure Miller. Professor Gubler was on this occasion equally felicitous. He considered the banquet offered to the French organisers of the Congress as a precious testimony of sympathy, as a feast of the heart, as a family *fête*, but what a large family! We were to constitute a family; there was no superior race; each nation had its qualities. And then, in a magnificent improvisation, he turned to each delegate as the representative, the one of sober Sweden, the other of wise and wealthy England, the other of strong Germany, and finally, after enumerating all the nations, he turned, amidst volleys of applause, to Dr. Pacchiotti, as the poetic representative of regenerate Italy. Such enthusiasm has rarely been witnessed, and something must be accorded to sanitary science, when we think that it has brought German and French to meet fraternally together. Mr. Chadwick's speech we give elsewhere.

Before concluding, we should not omit to mention the official reception of all the members of the Congress at the Ministry of Agriculture and of Commerce, M. Teisserenc de Bort having previously entertained at dinner the presidents and secretaries of the various sections. We hope that, when the International Congress meets in London, one of our Cabinet Ministers will be equally courteous and hospitable. Monsieur Koechlin Schwartz, the wealthy manufacturer, also gave a sumptuous entertainment to the members of the congress, so that their time was fully occupied during the ten days, and every opportunity afforded for the development of those international relations which can but benefit all peoples.

ANOTHER GREAT EXHIBITION.

However indifferent the rest of the world may have grown or learned to feel regarding International Exhibitions, Germany is not yet satisfied with the part she has taken in the great shows of recent years, and she now proposes to hold an Exhibition especially for the manifestation of her own peculiar industries, when we may hope to see that the critics have been unjust in ascribing to the German exhibits at former Exhibitions, the accusation brought against their products, that they are, to use their own expression, "*billig aber schlecht*,"—a phrase of which we are unwilling to give the English equivalent.

It is quite certain that the extraordinarily depressed condition of every branch of industry in Germany at present,—a depression which seems to offer scarcely a gleam of promising improvement, has suggested to the thoughtful manufacturers that a healthy impetus might be given to hope, by the announcement of a great Exhibition to be held in this country within a year or two.

The important industries of the world have had within the last few years four excellent opportunities afforded them of showing themselves in the great international exhibitions which have been held successively in England, France, Austria, and America.

In these exhibitions Germany claims that she has only been suitably represented at Paris in 1867 and at Vienna in 1873. At Philadelphia, proportionately, only a few German firms were represented; of these a great number, and not the most unimportant, had only exhibited because at the last moment they were called upon directly by the Government, so it can with reason be said that the German Exhibition at Philadelphia was only partial, and even as such, was only insufficiently prepared.

Hence it was that the German commissioner believed firmly that he must speak disparagingly from the very first of the German manufacturers, and this fatal cry re-echoed to the furthest limits to which German wares had penetrated.

As is well known, the German Government declined to participate in the Great Exhibition of this year at Paris, and the assent which was given to this conclusion by large numbers of the manufacturing circles showed clearly that International Exhibitions were no longer able to wake the universal sympathy of the world. Indeed, the importance which must be allowed to the Exhibitions of 1851 and 1862 has shown itself more and more wanting in each of the following Exhibitions, notwithstanding their superior pecuniary success. Paris, as a city of pleasure, *par excellence*, was justified in feeling that she might increase her power to avert such difficult financial crises as Austria was obliged to bear in 1873. Many believe that the era of International Exhibitions for the world at large, at least for a time, has passed. Germany, however, who till now has kept aloof, feels the time not far distant when she may be able to hold a successful Exhibition.

The provincial and special Exhibitions which are held from time to time in Germany (such a one as is now open at Hanover) have found more and more favour, and have aroused a wide-spreading and public interest.

To the German mind these circumstances prove that it is by no means the Exhibition in itself, but only as an ostentatious show that in its political aims it has gained discredit in Germany.

The idea of holding in that country a great Exhibition arose, in the first place, from the above-mentioned reasons; but there have been, in addition, very many serious considerations which led to the determination on the part of a large body of the German manufacturers to attempt the carrying out of their plan.

It can scarcely be denied that the insufficient representation of German industry at Philadelphia, stigmatised as it was also by a perhaps unfair condemnation, has caused a bad impression to exist in public opinion abroad, respecting German productions. This misunderstanding cannot fail to have been increased with foreign countries through the non-representation of Germany in the great Paris Exhibition of this year. All these circumstances will be traced back by their foreign competitors to the fact that the five years' crisis has weighed upon no country so severely as on Germany, and the conclusion will hence be drawn that German industry is no longer in a position to compete with the rest of the world.

It might be objected by some as an argument against this view that German exports have within late years greatly increased; but exports, which in many cases can only be sold with loss, point clearly to the conclusion that German goods abroad are beaten out by competition.

All these circumstances united, have seemed to point to the conclusion that a counter-action must be made, and the manufacturers of Rheinland and Westphalia are convinced that an exhibition would serve as a first step in this direction.

Rheinland and Westphalia are the great industrial and producing provinces of Germany. No industry worthy of notice is unrepresented in this extensive district. If Rheinland and Westphalia, or all the western provinces exhibit, then the whole of Germany may be said to exhibit, down to the most important branches, a circumstance which will thus be made known abroad.

The manufacturers of this important, and till within a few years, busily employed district, have met, and in the hopelessness of their serious position, have urged upon their countrymen the plan of an Exhibition, and in a recent meeting have proposed as the most suitable spot in which it might be held, the town of Düsseldorf, the prettiest, the most modern and modernised of the many cities of Rheinland. Düsseldorf has certainly won for itself a world-renown as an art-centre, and it is felt that the connexion of a trade exhibition with an art exhibition, as also the liberal employment of artistic taste in the arrangement and decoration of the Exhibition, will lend an additional charm to the undertaking. Düsseldorf is, thanks to the excellence of its means of communication, easily reached from abroad, more easily perhaps than any other German town, while its situation on the Rhine would involve for most Germans a delightful voyage along that most patriotically beloved and be-legended of rivers.

Though Düsseldorf, undoubtedly, not only as the centre of the chief manufacturing district of Germany, might seem a suitable place for such an undertaking, abounding as it does in urban charms, such as alone are usually found in capital cities, it is more likely, in the event of an Exhibition being held in this country, that Berlin would be chosen as the spot in which German manufacturers could at length have the opportunity, which they say they have so long waited for, of having full power to show the world their industrial strength.

Through the influence of the united European powers, all prospects of war may be considered to have been averted, and a durable peace insured; the German nation, therefore, now looks forward to the near prospect of a rich and rare harvest.

A universal hope is expressed that the difficult burdens which at present oppress the people may be lightened, and a call has been made, not alone on the manufacturers, but on all who are connected with home production, to aid the project of a national Exhibition, and to this end to employ their interest, heart and soul, for the common good of all, so that the country may be enabled to point out what German art and German industry are able to do, and to prove that confidence may be again won, not only at home but abroad, and by this means allow Germany to show that, as she has stood at the head of the world as the most powerful of nations, she is not willing, in the peaceful struggle of arts and industry, to remain behind her competitors and neighbours.

Düsseldorf.

MR. WATERHOUSE ON CURRENT TOPICS.

The following address, by Mr. Alfred Waterhouse, A.R.A., was read at the last general meeting of the Manchester Society of Architects:—

Some of us have recently attended the meetings of the Biennial Architectural Conference held in London, under the auspices of the Institute. These meetings,—whatever may be their direct advantages in the way of increasing our professional knowledge and stimulating our enthusiasm,—have at any rate one great indirect good; they make us better friends, disarm us of jealousies which could not exist if we knew each other better,—make us generously interested in each other's successes, and incline us to work for and trust in one another.

The interest taken in these Conferences outside our profession is also an encouraging sign. The distinguished people who came to our Conference dinner was a proof of this; the half-promise so graciously given by H.R.H. the Prince of Wales to preside at our next dinner was another. It is thought by some,—and I confess I am strongly of their opinion,—that good would result if the Conference did not always meet in London,—that its interest would be increased and the profession generally benefited if a meeting in the provinces alternated with one in the metropolis. I venture to think that a meeting in such towns as Manchester, Liverpool, or Edinburgh would afford abundance of interest to our brethren, and I am sure we should not be slow in offering them a hearty reception should they incline in this way to visit us here.

On looking through the address of the last President, I observed his remarks about the criticism of the Press on ourselves and our doings, which he attributed, in part at any rate, to the hostility of those from whom, as having been of our number, we should have expected a more generous treatment. I entirely agree with him in what he has said on this subject. Yet, on the other hand, may we not be becoming over-sensitive to adverse criticism? Does not the attention bestowed upon our works by some distinguished and cultivated people show a satisfactory interest in modern architecture? and though they may abuse its want of vitality,—sometimes, as we may think, ignorantly,—is it not better for our art that their utterances should be sometimes adverse rather than non-existent? Of all the arts, architecture is the one which most provokes criticism, because it has to do not only with people's æsthetic faculties, but with their comfort and convenience. It does not administer more to the delight of the few than to the well-being of the many. The extreme usefulness of our craft must be a sort of apology for public indignation if the matters of sanitary importance which come

within our consideration are suffered by any chance to miscarry. If we are blamed for what we feel cannot properly be laid at our door, we owe it in great measure to the position of absolute control over our buildings which we have acquired, and which it is certainly for the advantage of our clients that we should in the main exert. But is it not possible that we might do better if, instead of bewailing the injustice of our critics, we compared notes, and by explaining to each other our individual practices we were to endeavour to aim at the best practical solution of those difficult questions which lay us most open to criticism? Take, for instance, the occult art of the drain-layer. Mutual consideration of this problem might convince us of the desirability, in towns, at any rate, of having our drains put in by the local authorities themselves, or by some expert whose credit in the perfection of his work is absolutely at stake; for it cannot be denied that the profession has suffered much from imperfections in work which it is quite impossible for its members to see done in its entirety, and which it often happens that their representatives, the clerks of works, seem hardly alive to the importance of.

But to return to our critics. There are some of them who, though they hit hard, and not always, one is inclined to think, with much taste or discrimination, yet do so openly. They attack us to our face, not behind our backs, and these men, I think, should be held in far different estimation to the anonymous critic. The criticism of the Press must, of course, be to a great extent anonymous, but the editors of our professional papers, at any rate, ought to be able to discriminate between the words of disapproval spoken in the interest of art, and the disappointed utterances of personal animosity and spleen. I think that we have reason to believe that in this respect a better tone has of late years shown itself in our professional papers.

You are aware of the effort of the R.I.B.A. to draw the other cognate societies into closer relations with itself, not with a view of at all destroying their individuality, but in order that the advantages which spring from united action should be more generally felt. I cannot but think that the influence of the R.I.B.A. is powerful and salutary, and that it has a claim upon the support of the country architect as well as upon the metropolitan practitioner.

When the contemplated alterations in the premises are effected, its magnificent library will be still more available than at present, and the rooms in Conduit-street will present many of the advantages of a club to a country member, besides the unique one afforded by the treasures on its bookshelves. The time I trust will not be far distant when every British architect will desire to be admitted a member of the Institute, and then I hope a consistent scale of charges will be maintained, and our practice in this respect somewhat more equalised than at present. I do not only allude to our commission for the ordinary work of an architect, but also to that which is sanctioned in payment of a surveyor in taking out quantities. It is quite true that at present the Institute inclines to close its eyes to this matter. I cannot but think, however, that the time will come, and shortly, when the Institute will feel that its members are as responsible, unless the client himself gives definite instructions in the matter, for the work done by the surveyor and for the charges made by him, as for the excellence of the work done under their own immediate superintendence. The architect, in almost every case, nominates the surveyor, if he is not himself the surveyor, and surely ought to concern himself with the correctness of his surveyor's work and the propriety of his charges; for if the architect do not assume responsibility in this matter, who else is to do it? It is this sense of the duties of our profession towards our clients in this difficult question which has always induced me to believe that the right plan was for the architect to have the quantity-taking of his own works as much as possible under his own control, and when this was impossible, to employ men of the highest integrity and position; and I have sincerely regretted the action of the London Institute in forbidding its members to act in the capacity of surveyors to others of larger practice than their own, for what employment would be more remunerative or instructive to the young architect, with at times little to do on his own account, than, if properly qualified, to take off the quantities of the designs of others; and whom would architects in large practice sooner trust than gentlemen of probity and honour, who were striving to prepare themselves for careers of trust and responsibility? The Institute, I venture to think, will take cognisance of this difficult question, and when once its bearings on the responsibilities of the British architect are seen, such modifications in the bye-laws will be made as will enable it to embrace a much wider circle of practising architects than it can at present.

Manchester being essentially a city of the present,—and let us hope, of the future,—the efforts of its architects have, of course, been directed rather to the development of new works than to the restoration or preservation of old ones, and the somewhat fierce and undiscriminating attack on the restorers made by those who would have everything left as it is, has not, perhaps, much affected many of us personally. It is, however, somewhat interesting to observe that we have, perhaps, about reached the point of time when restoration as it has hitherto been understood and practised may be looked upon as a thing of the past. It has run its course nearly coevally with the career of the great man whose loss we have had recently to deplore, who may be looked upon as the Prince of Restorers, from the enthusiasm, loving care, and immense knowledge and experience of the probabilities of the past with which his operations were pursued, and from the number of the splendid monuments of Mediæval times which were confided to his care. Certainly nothing could have been better than the way in which some of our cathedral and church restoration has been effected. These monuments of the piety of the past have been reclothed in much of their pristine splendour, while the strengthening of their enfeebled parts has not been neglected.

In opposition to the treatment which these structures have received at the hands of Sir Gilbert Scott and his contemporaries and worthy rivals, we now see a determination to keep our ancient buildings as they are,—to reject nothing they contain,—to retain, in the Mediæval church, not only Elizabethan stall-work and Jacobean panelling, but even the pews and galleries which mark the era of our Hanoverian sovereigns, as all forming part of an historic whole, precious to the archæologist of the future. It is impossible to shut our eyes to the reasonableness of this view of the case when not pushed absurdly far. If our ancient structures, while still receiving all reverence at our hands, instead of being made more or less new, within and without, were simply to be kept water-tight, and tied and buttressed as their feebleness might require, they would undoubtedly be more historically valuable, and more picturesque, too, than many of our restored structures. For no doubt there is much to be said in favour of looking at this question from the painter's point of view; the building whose pavement is most worn, whose walls and roof have seen most service, is that which most appeals to our love and our sympathy. Who would not, for instance, have sooner wandered spell-bound over the intricacies of the pavements of St. Mark's before the restorer had begun to replace its stained and broken marbles with perfectly clean and faultless ones? If I am right in thinking that the days of the restorer are nearly over, I think we may be happy in the reflection that the talent which has hitherto been devoted to the endeavour to find out what once was, and to reproduce it, may in process of time find a richer and more profitable field for its display in the production of original work. Most architects, if they be archæological explorers for the greater part of their time, can scarcely be very successful inventors during the remainder: the conservative habit of thought required for their principal occupation has to a certain extent unfitted them for the due performance of their functions as innovating architects. If the purpose and beauty of our buildings were everything to us and ancient precedents nothing, I feel quite persuaded that as artists we should not only succeed in designing satisfactory buildings, but they would have a character of their own quite distinct from anything which has gone before them, and we should at length discover that we had,—without ever intending it or thinking about it,—a new style, a style embracing all the necessities, all the wants and inspirations, of our day, but reflecting no picture of the past. We should have no care about the language of our art, because we should think in it and express ourselves in it quite naturally and without effort, and have all our energies ready to devote to the specialities of each case.

I feel that I may express such opinions as these before Manchester architects with the more confidence, because they have of late years shown themselves freer than most from the trammels of precedent.

Among the many subjects of interest which are engaging the attention of architects is that of *new materials*. And of these I know of none more likely to affect the character of the architecture of the future than Portland cement and terra-cotta. As to the former, we may look to its successful employment in the floors, lintels, and staircases of our buildings, in combination with burnt clay or other incombustible material, with or without an iron core, as giving us a construction not only absolutely fireproof, but of enormous strength and durability. The experiments made by Mr. Hyatt on slabs of concrete, in which wrought iron was embedded, prove that it was of little advantage in such circumstances employing joists of the ordinary H-section; that the upper flange and web could be successfully dispensed with if the concrete properly surrounded the ironwork, the power of the concrete itself above the tie or tension rod (which the equivalent of the lower flange thus became) being sufficient of itself to resist all compression. Mr. Hyatt has also established the important fact that no heat which could be applied to such blocks affect their homogeneity, the wrought iron and concrete contracting and expanding equally and together.

There is no doubt that the great authorities who have spoken and written of brick arching supported on wrought-iron beams as fireproof, even though the upper or lower surface of the beams, or possibly both, were exposed, have, by their teaching somewhat delayed the development of fireproof construction; but now it seems to have been conclusively proved that wrought iron, however dangerous if exposed, yet if completely embedded in a concrete formed of Portland cement and burnt clay, or other incombustible ingredient, is absolutely proof against any ordinary fire.

The other material of the future to which I have adverted is terra-cotta. Our clay is inexhaustible; our quarries, or at any rate some of them, on the other hand, do not appear to be yielding such good stone as formerly; it is increasing alarmingly in price, and the cost of working it, owing to the rise of wages and the trade unions, is no less alarming; while owing to the spead of our large cities, and the deleterious gases which our chimneys are permitted to emit, the power of resistence to atmospheric disintegration, even in the best of stone most carefully selected, seems to be year by year getting less. The most feasible way of meeting this difficulty seems to me to be the improvement of the manufacture of brick and terra-cotta, and the preparation of our designs to meet its special requirements. It is somewhat unfortunate that the South Kensington Buildings, designed by the Royal Engineers, have all been in a style which involves a larger block than terra-cotta can easily be made in to insure accuracy of line, and so even the beauties which the artists of the Department of Science and Art have imparted to the material, has never been able quite to overcome one's regret at the want of truth in the allignment of the terra-cotta work I am alluding to. Of course, there is a difference in the various clays used in the manufacture of this material; but under ordinary circumstances the architect should, I think, endeavour to select a clay which requires no admixture with other clays. From one sort of coal-measure clay he will be able to get terra-cotta of every tint from light saffron or cream colour through every shade of orange-brown, and even purple, according to the action of the fire; from another, every shade of red. It is also easy to obtain other colours (say grey) by amalgamating the staining material (say cobalt) with the clay, running a layer of this coloured clay into the mould first, and then backing up with ordinary clay. Of course, if a block of two or more exposed sides is wanted, it may involve the exclusive use of the coloured clay, and so increase the expense.

For economy's sake, the architect should endeavour to keep his blocks within moderate dimensions (say 15 in. by 9 in. by 4½ in.), though where it is necessary he may use them much larger (say 4 ft. by 1 ft. 4 in. by 10 in.). The clay should be well burnt, even to producing diversity of tint, which is one of the great charms of the material; a wide joint is also of importance, the cement or mortar being well cut back to prevent the edges "flushing." One

* By Wisbech ciation.

of the greatest advantages in the use of the material, however, is the facility with which the blocks can be keyed together. A hundred ways of doing this, to meet his various requirements, will suggest themselves to the ingenuity of the designer.

Though I have now employed this material in preference to stone for some years, and in many cases used thin slabs (1½ in. in thickness), properly keyed into others surrounding them, 6 in. on bed, as a casing to common brickwork, I have never yet noticed a single case of fracture or decay in any of the blocks.

It is quite true what has been urged against this material, that the ornament, in the general way, must be moulded, and therefore almost of necessity becomes the victim of repetition. The discreet designer will therefore, in all probability, incline to the use of geometric forms for his ornament, which will not suffer from a certain amount of repetition. The omission of forms more or less reproducing nature is the less to be regretted now-a-days, when it is so difficult to get carvers to execute even in stone figures or foliage which can truly be said to marry with the architecture of which they ought to form the chief attractions. I think many will agree with me that our modern architecture is often definitely better without its carving, and so long as this is the case no strong argument can be adduced against terra-cotta on this score. Though if it comes to the highest work of the artist, which it is not desired to repeat in any fashion, no material can be better than terra-cotta. The clay may pass direct from the artist to the kiln, and thence to the building, without a touch from any inferior hand.

It may be as well to add that the ordinary material can be fixed at about 4s. 6d. per cubic foot, and can be easily washed with water, lime stains being removed directly with muriatic acid. The proportion of waste in burning I find to be about 5 per cent.

If I have been somewhat prolix in urging the merits of terra-cotta upon your attention, it is because I have had of late years some experience in its use; and it is perhaps as well, when we address each other, that we should give each other the results of our own experience.

ANCIENT RECLAMATIONS.*

I PRESUME that many visitors to Wisbech on the great occasion of this Congress will, for the first time in their lives, become acquainted with the great English Fenlands, and will, perhaps, at first sight, be little impressed with the scene before them. My object in this monograph, however, is to awaken that just interest which, without doubt, this strange country's story possesses, and if these flat rich pastures, and regions of dykes and dams, may perchance lack some of those stirring tales of chivalry and daring with the recital of which Mr. Motley's pen has consecrated the lowlands of Holland and Zeeland, yet I venture to think that the English fenlands, on their part, have a story of much enterprise to tell. Although happily that enterprise has been more confined to contests with nature than with man, yet even these English Netherlands are sacred to the genius of liberty and freedom, for it was here that the brave Hereward, the "last of the English," as Kingsley calls him, made his stand against the Norman conqueror. That tale had been told so many times, and by such distinguished men, that it will be sufficient to remind you of it. Indeed, I hope that at this Congress, the exploits of Hereward will meet with an abler chronicler than myself. He is a local celebrity, and therefore I must leave him in local hands, that justice may be done him by his countrymen. But, *en passant*, I would draw your attention to a very remarkable common-place form of error, which is that of ascribing all the great and heroic qualities in the world to mountaineers; and forgetting that in the world's story the lowlanders have had an equal, I may say a greater, record of their own to hand up in the Temple of Fame, and have shown quite as great a national life and love of the sacred cause of freedom as their more elevated contemporaries. Thus we see that in the universal desolation which overtook Italy in the destruction of the Roman Empire, a few sand flats in the Adriatic gave a refuge to some bold patriot spirits, where for more than a thousand years Republican Venice defied the despotisms of the world. The struggle of the gallant Dutch Republic in the sixteenth century against the then most powerful empire in Europe is a conspicuous example of the patriotism of the lowlander; but no more striking instances need be sought than those in the story of this English fenland.

In South Lincolnshire there is little doubt but that the three great families of the Hollands, Welles, and Lords of Kyne, made so successful resistance to the Conqueror that an arrangement was made in their favour, so that they might preserve their estates. It was in the fenlands, near Ely, where the great Hereward, five years after the battle of Hastings, established his "Camp of Refuge," and whence he carried on that guerilla warfare which made his name so famous. Later on, in the time of Stephen, we find that Nigel, Bishop of Ely, and Alexander, Bishop of Lincoln, established another camp of refuge on the same Isle of Ely. In the time of John, many partisans of the popular cause fled thither for protection of their life and property; and after the battle of Evesham, in the time of Henry III., the same island became a refuge for the patriot barons, where they were besieged by the King and Prince Edward. Nor did they surrender until, by the "provisions of Oxford," those liberties were secured which were, to use the words of a modern writer, "to prove in no mean degree the foundation of England's greatness."

Thus we see that these lowland plains were consecrated to the genius of freedom; and before I quit this part of the subject, I would draw your attention still further to another remarkable fact,—that just in proportion as we find a country lacking great natural features, so do we find that architecture there develops itself in its most majestic forms; as if the very sameness and monotony of the horizontal landscape induced men to raise lofty piles and spires pointing heavenwards, as thereby seeking to elevate their thoughts above the abject level of the plain. We do not go to Wales or Cornwall or Cumberland to seek our noblest churches, but we find them in flat Lincolnshire, and in the fenlands where we now are. As the plains of Lombardy have developed the fairest of all cathedrals at Milan, so the flat ground by the Ouse at York supports our noble minster. Here, around us, we have Ely, Lincoln, Peterborough, all pointing heavenwards above the lowland plain, as we see abroad the majestic piles of Strasburg, Cologne, Vienna, and Antwerp, rising from similar abject surfaces. The mountaineer's thoughts are carried upwards by the very conformation of the land in which he lives; but the lowlander can alone have his thoughts raised heavenwards by the living labour of his hands, and by his own innate conception of the beautiful, the great, and the good.

Before the drainage of the fenlands was accomplished, the appearance presented by unassisted nature must have been distressing in the extreme. The eye then could have seen nothing but a vast morass, the home of the heron, the wild swan, and the cormorant. A few miserable, half-savage representatives of humanity, perhaps, obtained a precarious subsistence amidst the reeds and rushes of the bogs, and struggled through life amidst frequent attacks of ague and rheumatism. The fens, to those who have not visited them, still possess a bad name; but an inspection of them will dispel the misconception. As the traveller journeys through the district, he will be surprised to find that there is not a more fertile and better cultivated place in the kingdom. On every side he will note rich pastures, abundant corn-fields, and comfortable homesteads, well stocked with healthy cattle. As Cobbett once observed, "Here are the largest beasts and fattest sheep to be found from John O'Groat's to Land's End"; and the general appearance of the population will prove to the observer that this district is now as favoured as any other in these islands. Although he will find the landscape monotonous, the sight of the great artificial canals and drains will in some measure compensate him for the absence of more striking features; and he will be impressed with the evidences of that enterprise and perseverance which has transformed a morass into one of the most smiling and prosperous parts of the kingdom.

My object in this paper is to record as briefly as the limited time allotted to me will permit the various works which have from time to time been executed in this district.

First of all I must explain that the general surface of the fenlands in the neighbourhood of Boston, Spalding, Wisbech, and Lynn, was, near the outfall of the rivers, from 10 ft. to 18 ft. lower than it now is; and it is also supposed, on good authority, that the upper part, even of the great level of the fens was in ancient times at least 5 ft. lower than at present. Hence it follows that the lower part was covered daily by tidal waters, and resembled those salt marshes which are found at this time about these coasts. The upper part, although, as I have said, 5 ft. lower than at present, was sufficiently high to grow forest trees.

The first great engineers who approached the district seem to have been the Romans; to their labours, without question, belong the honour of having erected those stupendous embankments by which this vast tract of country from the sea, and without which neither the towns of Boston, Spalding, nor Wisbech could have been built, as the spring-tides must regularly have covered their sites. It is computed that these immense banks extend for about 150 miles along the old sea border of the fenlands, and a good authority states that at least eleven millions of tons of material must have been used in their construction, or about as much as would on an average be used in making an ordinary English railway of 200 miles long.

It appears, however, that the Romans did not execute the outer bank which bears their name first of all. Other banks in the interior of the district have been attributed to them. The most noteworthy of these, and probably one of the earliest, is that which is called the Raven, sometimes the Roman bank, extending from the Welland, near Cowbit, and running in an easterly direction to the Delph bank, which joins the outer sea-wall. As the Roman occupation extended over some 370 years, it is quite possible that a considerable lapse of time occurred between the construction of the Raven and the outer bank. It is here worth while to note that whereas certain Roman fortresses are said to have been traced at Whaplode Drove, Gedney Hill and Sutton St. Edmund, all just inside the Raven bank, no Roman station has been discovered outside of it in the ground reclaimed by the outer wall. It is necessary to explain here that the formation of great embankments involves considerable difficulties, for although they serve to exclude tidal waters, they on the other hand prevent the escape of the flood waters and natural rainfall of the district, for which some means of escape must be provided. The Romans, with their customary astuteness, seem to have understood this thoroughly, in a way which many great modern engineers have failed to do; and they constructed an immense artificial canal, now known as Car-dyke, which is supposed to have extended at one time all the way from Ramsay to Lincoln. It has been thought that this canal was used by them for purposes of navigation also, from the fact that along it they erected forts at seven places, viz., at Northborough, Braceborough, Billingborough, Garrick, Walcot, Linwood, and Washingborough. But the primary object of the great work was without doubt the interception of the upland interior fresh water and its conveyance to the river.

At the beginning of this century Rennie reverted to the Roman system in draining the east and west fens. The Car-dyke extends for a distance of about forty miles, and it has a width of nearly 60 ft. To show how much the safety of this country depends on these great Roman works, it may be mentioned that in 1810 the sea broke through the sea-wall and inundated the country from Wainfleet to Spalding, causing immense havoc. The town of Boston was flooded, the waters rising as high as the pulpit in the church, and many cattle were drowned, and numbers of corn ricks and hay stacks were swept away.

In considering, however, the permanency of Roman works and their effect upon the modern state of this country, it is important to remember that many of the sites of the ancient Roman cities are now actually occupied by modern towns. Lindum is Lincoln; Causennis, Ancaster; Vainona, Wainfleet; Durobrivus, Castor-on-the-Nene. Cambridge was Camboritum; Durolipons stood probably near Godmanchester; and in Icklingham we have Icano, possibly. Some local authorities seem to make Boston the modern representative of Causennis. The site of the Roman station at Wisbech is in the fork between the ancient beds of the Nene and the Ouze; but the first historical mention of Wisbech appears only in the charter of a grant

* By Mr. J. W. Grover, F.S.A., C.E. Read at the Wisbech Congress of the British Archæological Association.

made in the middle of the seventh century, by Wulfere, king of Mercia (Kemble, Codex Diplom., vol. v., p. 4).

The Romans have left various other traces of their dominions in this country. A village called Colne is supposed to derive its name from a Roman colonia, and lies two miles west of Earith Bulwark, in Hunts., which was a work of the same people. At various other places this encampment has been traced, viz., at Stamford, North Kyme, Horncastle, Burgh, &c. As is usual where there were stations, there were also military roads. The principal ones which have been located hereabouts were:—

1. The Ermine street, which is supposed to have derived its name from Herminius, started from London and passed through Cambridge, Ancaster and Lincoln.

2. The Salt Way branched off from the latter and went to Leicestershire, *viâ* Saltley.

3. The Foss Way, which came from Aquæ Solis (Bath) to Newark, and thence to the west side of the Fens, and to Lincoln.

4. A road, name unknown, from Doncaster to the north of Lincoln, thence *viâ* Horncastle and Little Steeping to Wainfleet.

5. The Via Devana crossed Ermine-street near Huntingdon and thence to Cambridge.

6. Akeman-street from Cambridge to Ely and Littleport. This road crossed the Little Ouze near Brandon, and passed by Southery and Downham to Lynn.

7. The Icknield way, which was probably a British track, ran south-east to the Fenlands, along a line from Kentford and Newmarket, thence southwards till it crossed the Devil's ditch.

8. Bullock-road ran from Verulam (St. Alban's) to Chesterton-on-the-Nene; usually considered a British road.

9. The Fen-road commenced in Norfolk, passed on to Swaffham and to Denver, and north of March by Whittlesea to Peterborough.

I give these roads chiefly on the authority of Miller and Skertchley's "Fenlands," page 40.

There is a remarkable statement in Gough's Camden (Introduction, p. 139; 2nd edition, 1806), in which it is said that Sosimus tells us that Probus sent into Britain the Burgundians and Vandals, whom he had conquered, who, settling here, proved of great service to the Romans whenever any disturbance happened. Where they settled I know not, unless it was in Cambridgeshire; for Gervase of Tilbury mentions an ancient camp in that county called Vandalsburg. In another place he says that below Cambridge was a place called Vandalsburg, from the Vandals, who made a camp here, whence they ravaged part of Britain; the plain where they pitched their tents, on the top of a little hill, is trenched round, having only one entrance.

It has been thought by some writers that these Vandals might have been employed in the construction of the Roman reclamation works in the fens. I have been unable to find any good authority, however, for this statement, and the only ground which seems to exist for it is in the fact of the Emperor Probus having been fond of drainage works. Indeed, he lost his life in a meeting of his legions in draining the marshes of Sismisun. Other writers say that the Romans employed a colony of Belgians for the purpose.

I have dwelt thus at length on the works of the Romans, because to them really is due the very existence of dry land at all in the fens. All that has been done since has been to improve and develop only. The stupendous works of these ancient conquerors of the world in excluding the tidal waters by their great sea-walls, rendered subsequent drainage schemes feasible and desirable, and gave the English nation one of its most valuable and fertile provinces. This statement is best proved by the disastrous results which followed a breach in the old Roman dam in 1810, to which I have already alluded.

After the departure of the Romans, when the flood of Teutonic barbarism swept over those islands, the great sea defences were suffered to fall into decay, and the deplorable state of the fens can be gathered from the life of that famous Saxon Saint Guthlac, wherein we hear of "inundations and overflowing of rivers upon the level ground, making deep lakes, rendering all uninhabitable excepting some places which God of purpose raised to be the habitations of His servants who chose to dwell there, for in such places do they (the inmates of Ramsey, Thorney, and Crowland), and many others besides them live, to which there is no access, but by navigable vessels, except unto Ramsey, &c." The story of St. Guthlac is thus given in Dugdale, p. 178, and it is worth quoting, for it gives us some idea of the horrors of the fens in Saxon times:—

"There is in the middle part of Britain (saith the writer of this saint's life) a hideous fen of huge bigness, which, beginning at the banks of the river Grouto, not far from the castle bearing that name, extends itself from the south to the north in a very long tract even to the sea; oftimes clouded with mists and dark vapours, having within it divers islands and woods, as also crooked and winding rivers. When, therefore, that man of blessed memory, Guthlac, had found out the desert places of this vast wilderness, and by God's assistance had passed through them, he inquired of the borderers what they knew thereof; who, relating several things of its dreadfulness and solitude, there stood up one amongst them called Tatwine, who affirmed that he knew a certain island in the more remote and secret parts thereof, which many had attempted to inhabit, but they could not for the strange uncouth monster, and several terrors wherewith they were affrighted. Whereupon St. Guthlac earnestly entreated that he would show him that place. Tatwine, therefore, yielding to the request of this holy man, taking a fisher's boat (Christ being his guide through the intricacies of this darksome fen) passed thereunto, and it being called Cruland, and situate in the midst of the lake; but, in respect of its desertness, formerly known to very few; for no countryman before that devout servant of Christ, St. Guthlac, could endure to dwell in it, by reason that such apparitions of devils were so frequently seen there. . . . . Not long after, St. Guthlac, being awake in the night-time, betwixt his hours of prayer, as he was accustomed, of a sudden he discerned all his cell to be full of black troops of unclean spirits, who crept in under the door, as also at the chinks and holes, and, coming in both out of the sky and from the earth, filled the air as it were with dark clouds. In their looks they were cruel and of form terrible, having great heads, long necks, lean faces, pale countenances, ill-favoured beards, rough ears, wrinkled foreheads, fierce eyes, stinking mouths, teeth like horses, spitting fire out of their throats, crooked jaws, broad lips, loud voices, burnt hair, great cheeks, high breasts, rugged thighs, bunched knees, bended legs, swollen ankles, preposterous feet, open mouths and hoarse cries; who with such mighty shrieks were heard to roar that they filled almost the whole distance from heaven with their bellowing noises; and, by-and-by, rushing into the house, first bound the holy man, then threw him out of his cell, and cast him over head and ears into the dirty fen, and having so done, carried him through the most rough and troublesome part thereof, drawing him amongst brambles and briers for the tearing of his limbs."

It seems that some descendants of the ancient Britons inhabited these watery wastes in Saxon times, and were looked upon as even worse neighbours than the fiends themselves; for we read that the saint was disturbed one night by a "horrid howling," whereat he was much terrified, thinking that the howlers might be Britons. Determined, however, to investigate the cause, he bravely turned out of bed, and looked out into the gloomy night air, when he discovered, to his great comfort, that the noises only proceeded from fiends and devils. Finally, however, being provided by St. Bartholomew with a whip, its scourge having three tails, he was able to keep his assailants at a respectful distance. This whip is figured on the Crowland halfpenny, and also on a shield on Knulph's cross.

I give this story to show what an uncomfortable place the fens must have been in Saxon times. To quote the words of an eminent writer:—"We may with great probability look upon the undrained fen as a vast open plain, covered, for the most part, with deep sedge, dotted with thickets of alder and willow, abounding in shallow lakes, temporary and permanent, and overflowed in its lowest parts nearly if not every winter."*

Map of Cyprus.—Mr. Jas. Wyld has issued a new map of Cyprus which will be found a very important contribution to the present knowledge of the island. It includes an agricultural and a geological map.

* The remainder in our next.

LASCELLES'S CEMENT SLAB COTTAGES.

The system of building with cement slabs on a timber or cement framing, patented by Mr. Lascelles, of Bunhill-row, has been before the Institute of Architects more than once, the last occasion being at the discussion on concrete building, at one of the meetings of the Conference of Architects this year. The practical advantages claimed by the patentee for his system are undoubtedly of great importance if realised; though some of them, such as the quality of indestructibility by fire and resistance to damp, are what are common to other forms of building in which cement concrete is used. The specialty of Mr. Lascelles's method is that he gets rid of the necessity for casting walls, as one may say, in a mould, and the consequent difficulty in altering and varying a design with due attention to economy, which is the great drawback to concrete building on the system of packing concrete between boarding. The articles kept in stock for this method of building include "fish-scale tile" slabs, 2 ft. by 3 ft. and 1½ in. thick; plain slabs of the same size and thickness; lining slabs faced on one side only, and 1 in. thick, the rough side forming a key for plastering; and cement studs with iron in them, 4 in. by 4 in. scantling, for taking the place of timber quartering, and thus rendering the whole house in construction fireproof. The cement studs are not, however, recommended except for very damp situations, or where there is a special reason for rendering a building fireproof; otherwise wood studs are both cheaper and more convenient. The slabs are rebated to keep out wet, and the house may be built either with one thickness of cement slabs outside the framing, or with an inside slab wall also, leaving a space between. With regard to the capability of the single slab wall to keep up the requisite temperature, the author states that he tested one with a thermometer in cold weather, as against a 10-in. thick brick and plastered dwelling close by, and the cement house registered four degrees higher than the brick one. They can be built almost without foundations, at least without deep trench-digging for footings; and Mr. Lascelles has had legal evidence to the effect that they may be regarded as tenants' fixtures (except the foundations), not being built into the ground, and can therefore be removed by the tenant when changing his ground. He adds, not without reason, "that buildings erected to all appearance as solid and substantial as any brick house, and really as waterproof and durable, and which can yet be taken down and carted away when the lease expires, and re-erected in a short time fit for immediate occupation, are absolutely unique."

They certainly are so; and as far as country cottage building is concerned, we expect that this method will be found useful, as it is independent of times and seasons; "the slabs can be kept in stock, so that the building of the house is reduced to the mere screwing together of the materials all dry and fit for use; in fact, the house can be three-parts made in the builder's yard." It seems obvious, however, that such a shell-like method of building as this can only be applied to dwellings on a small scale, and is unfit for towns. It has the advantage, however, over other methods (so far) that it can be made as picturesque as any other method of building a country cottage. The patentee has secured the valuable co-operation of Mr. Norman Shaw to assist him in putting this material into picturesque shape, and publishes a very pretty volume of cottage buildings drawn by Mr. Maurice B. Adams from that gentleman's designs.* Many will, no doubt, be extremely pleased to turn over this book and find that they can have what will be considered to be such picturesque little buildings in a material possessing so many practical advantages, and which has not hitherto received very picturesque development. We cannot but think, however, that even a better result might have been obtained had there been less of archæology and more of architecture in these little buildings. We should never wish to speak otherwise than respectfully of anything produced by Mr. Norman Shaw, but we must confess that we fail to see the reason for thus imitating old rustic buildings in a modern material, unless it be to catch the sympathies of the large class of people who still believe that there is a charm in whatever is old-fashioned in building and something

* Sketches for Cottages: Twenty-eight original Designs. No. 121, Bunhill-row, London.

wrong about whatever is new. Most of these designs, pretty and picturesque as they are, are little more than successful reproductions of various forms of cottages to be found at the roadside in country districts in England, and their merit with many people will be (and we have already heard the remark made) that they look like something old. Our opinion is that here was a real chance for doing something new on the basis of a new material and method, which chance has been deliberately and almost perversely thrown away; for the very surfaces of the cement-slabs are made in what is called by the builder a "fish-scale pattern," to imitate the effect of wall-tiling, and it is promised that the slabs may be stained with an indelible red stain with the same object. All this dressing up of the new material in the old cloak is so much labour thrown away in making a sham. The object should be to find out how to treat the material picturesquely, showing it as what it is. But there is a more serious practical objection to some of these cottage designs, and one which we confess we are really surprised to find in a book put out in the name and under the direction of Mr. Shaw, who in general may claim the unusual merit (with modern architects) of combining with a perception of the picturesque a keen eye to the practical requirements of planning. But here again he seems to have been carried away by his admiration for what is old, even down to nomenclature. He introduces a style of house "common in France and Scotland, but unknown in the neighbourhood of London," in which the beds are placed in recesses in the rooms. There are two rooms, which we must need be asked to call the "But" and "Ben," the old Scotch phrase for the outer and inner rooms so familiar to us in the Waverley novels. Why, in the name of common sense, may we inquire, are we to be asked to talk Scotch in the neighbourhood of London merely to please an architect's archæological fancies, when English has served us all this time? We can only conclude that somewhere between the contractor and his architect the idea of what is really no more than a catch-penny title has got itself in; that the patentee expects that his "but-and-ben" cottages will become a fashion and be in demand. As a matter of worldly wisdom he is very likely right; in London neighbourhoods we fear it may be said that, more than in any other part of the world, it is only necessary to get a good catchword to make a thing go down. The plan of the "but-and-ben" cottage is doubtless economical of space; but we object to it strongly on sanitary grounds. We have constantly had to point out the oversights committed in planning small houses, whereby the inmates are put to sleep all night in the most unventilated corner of the room. But here is absolutely a special provision for the evil in an aggravated form; the beds enclosed in recesses between three walls, and the children's bed actually one-half behind a fourth wall, with only space enough to get in and out: the room being also used all day for a living-room. This is most unhealthy, and a plan which ought not to be adopted in any new cottages. We must be pardoned for saying that when we saw this recommended as a form of cottage in use in Scotland, it immediately reminded us most forcibly of the sluttish northern proverb quoted by Scott in describing Mucklebackit's house in "The Antiquary,"—"The clartier* the cosier," as indicating the Scottish peasant's idea of the perfection of home comfort. The English peasant is quite shy enough of ventilation already, and does not need a house planned especially to foster his tastes in this respect; and we must say we do not wish to see this form of cottage plan become common "in the neighbourhood of London."

Mr. Lascelles has brought out some other building appliances in the way of moulded concrete bricks, &c., which seem likely to be useful, though this will depend a good deal on their cost, of which we have no particulars, nor have these particulars as yet been furnished to the Museum of Building Appliances in Conduit-street, where the materials are to be seen. The moulded bricks for strings appear to be truer in line than hard-burnt bricks or terra-cotta, and harder and more durable than the bricks used for cut ornament; but we must see more of them in use, and have more information as to cost, before positively recommending them.

* *Anglicè*, "dirtier," or, perhaps more literally, "stuffier."

PROPOSED NEW CLUB.

London, although not a geographical centre, is the recognised centre and capital of many important national interests; and naturally so, from its being the seat of the Imperial Government and of the Legislature; the head-quarters of the Army and Navy; the chief emporium and distributor of exports and imports, from its possession of the docks, quays, wharfs, and warehouses of the great "Port of London." It is the capital of many other minor interests, and, *inter alia*, has been the birthplace and cradle of club-life. In establishing clubs of various kinds, for divers purposes, the example of London has, during recent years, been extensively followed in the provinces, every provincial city, or town of considerable population, has now its club, and many of them more than one, but none of these approach the metropolis in the number or variety of such institutions.

The names, presumed objects, and leading characteristics of the most important clubs of Pall Mall and its purlieus,—the club region *par excellence*,—are known, probably, to almost every reader; such, for instance, as the Carlton, the Reform, the Athenæum, the United Service, the Conservative, the Travellers', the Guards', the Royal Artillery, the Army and Navy, the Junior United Service, the Junior Athenæum, &c. The kinds of "birds of a feather" that may be expected to "flock together" in some other clubs are sufficiently indicated by their titles, such as the Alpine, the Arts, the Fine Arts, the Farmers', the Colonial, the Garrick, the Grampian, the Law, the University, the Eton and Harrow, the Oxford and Cambridge Universities, the Volunteer Clubs, the Yacht Clubs, the Coaching, the Four-in-Hand, the City of London, City Commercial, the Oriental, East India, the Athletic, the Skating, the Cricket, the Aëronautical, the Green Room, the Bicycle, with many others, representing political, literary, artistic, scientific, professional, sporting, and other interests. The names of some of the proprietary and other clubs scarcely indicate their objects, such as Boodle's, Brooks's, the Beef-steak, the Cavendish, the Berkeley, the Portland, White's, the Thatched House, Smithfield, the Gresham, and others. If an opinion expressed a few days since at the Guildhall Police-court by the presiding magistrate is correct, it is to be feared that in addition to the advantages that the clubs give to political, scientific, literary, and other interests, they pander to and facilitate the vice of gambling. The opinion he expressed was, that some of these "proprietary clubs" seemed to be little or nothing better than "hells." But there are clubs and clubs, and it may be believed that those in which card-sharpers are tolerated are rare exceptions.

The members of Parliament have their St. Stephen's Club; the Westminster and other engineers, military, civil, and mechanical, have their Whitehall Club; but among all the interests represented, the railway interest is conspicuous by its absence, and it is not to be wondered at that railway officers should be exercised as they are on the subject of founding a club, the advantages likely to result from which should be obvious. "As iron sharpeneth iron, so doth the countenance of a man his friend." It is not intended, we believe, that the projected club should be for chairmen of companies or directors, but for railway officers, who could meet each other in an easy unconstrained way, compare notes on business affairs, and by such interchange of knowledge and experience, strengthen each other and improve all round the capabilities of the members for the discharge of their onerous duties; and, besides, form, probably, many valuable friendships.

In addition to the ordinary advantages offered by clubs, a railway club would be able to extend the special benefit to its members of bringing within their reach the whole of the professional literature of the rail, in periodicals, pamphlets, patents of new inventions, affecting railway working and management, &c. At present, many matters of value and interest, and that would probably greatly increase the efficiency of managers, engineers, superintendents, principal station-masters, and other railway officers, entirely escape their notice, from the impossibility of their commanding, or possessing themselves of the publications or documents in which the information is contained. A well-supplied and ably conducted railway club, library, and reading-room would supply all they need or could desire.

It is true that at the periodical meetings of railway officers, at the railway clearing-house, a species of Railway Parliament is held, at which very important questions affecting railway management and traffic are settled from time to time, but it cannot be too much to say that such decisions would lose nothing in respect of being ripe and well digested, by the free and easy discussion they might receive at the club before being formally tabulated at the Clearing-house, the meetings at which cannot, in the nature of things, serve the same purposes as would be promoted by the designed institution.

Provincial railway officers, we are told, would appreciate such an institution very highly, on account at once of the intercourse and the information it would place within their reach when they come to town.

As regards "ways and means" it would not be necessary to erect a building specially,—that might come afterwards. A good roomy house might be taken in a central situation, and the expenses could be easily met, if the promoters receive the support that they ought to do.

There are fourteen railway companies with London termini, and, adding the clearing-house for fifteen, these might possibly be good for from fifteen to twenty members each. The number of railway officers in the United Kingdom is over 700, a number quite sufficient to provide a proportion of members to make the project a success from the commencement, which it deserves to be. It would be unwise to rely upon the support of honorary members, but there is little doubt that many gentlemen interested in railway property and affairs will be willing to give their support.

CAMBERWELL WORKHOUSE COMPETITION.

In describing the accompanying design, it is needful to say that this competition was a limited one, and that it was decided in the commencement of last year,—for particulars of which the reader is referred to the pages of the *Builder*; he is also referred to some correspondence upon the subject recorded in our pages at the close of the year, and by which it will be seen that this competition must be placed amongst those which have terminated in a manner very unsatisfactory to the competitors generally. It would appear that the design which obtained the second premium, and which is here illustrated, should properly have obtained the first place.

The conditions of the competition required that the workhouse should accommodate 400 able-bodied paupers in equal numbers of each sex, and 100 children, with provision for future extension.

The accompanying plan to scale shows the principal arrangements.

The administrative block shows the disposition of the master's residence, the executive, the kitchen and stores, together with the inmates' dining-halls, corridors, &c.

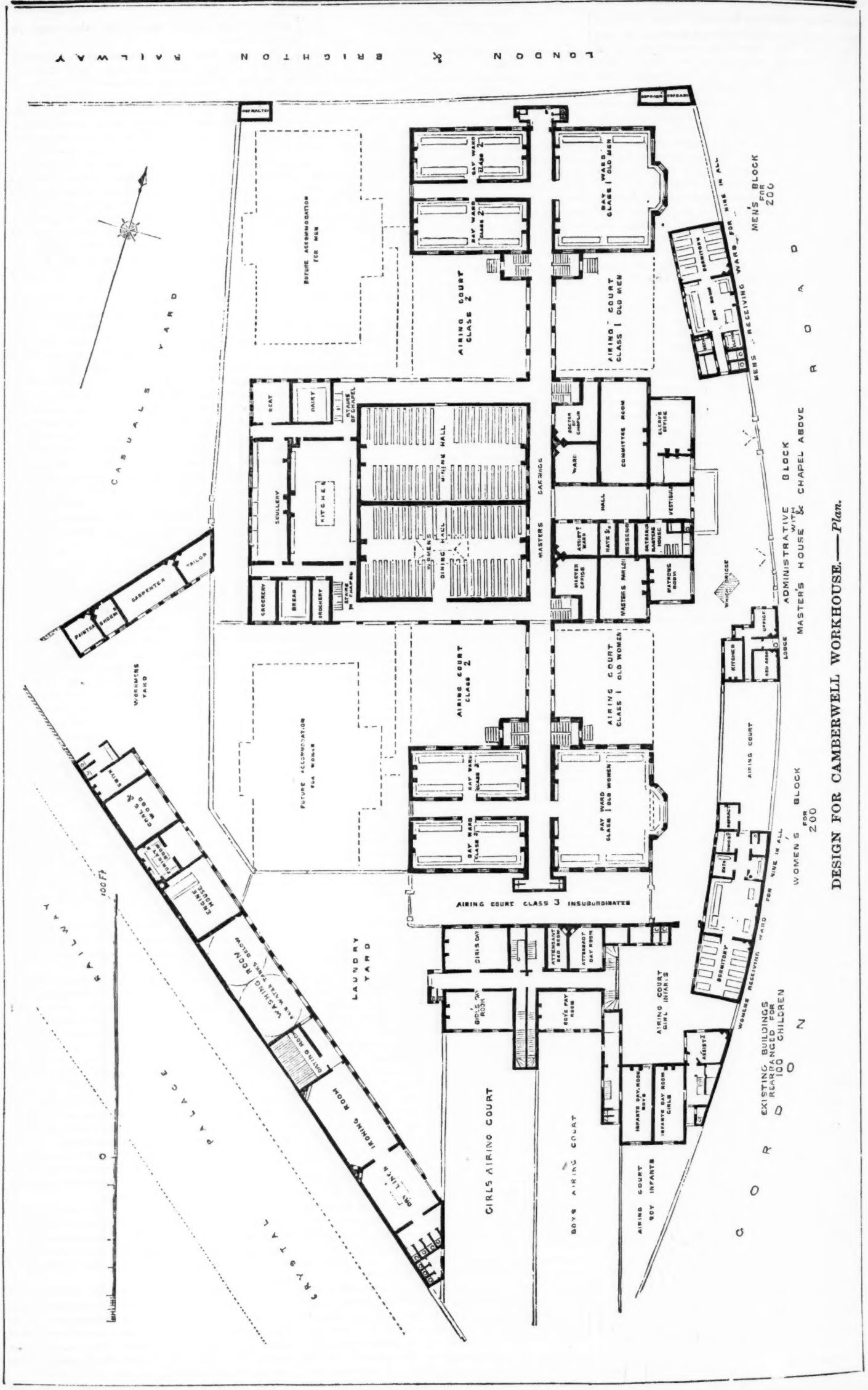
The chief points aimed at in the distribution of the plan are,—the complete separation of the sexes; the subdivision into classes for age and conduct, facility for access, and supervision; continuity of connexion of the inmates' blocks with the administrative, and a covered way throughout; provision against fire, in ample fireproof corridors and staircases; the utilisation of the existing premises, which in this case were to be used for the children, after remodelling the same internally; the provision of as much airing space as possible; and to indicate the maximum for future extension.

The chapel and upper parts of the master's residence would occupy the one-pair floor; and it may be observed that the master's residence is complete and private in itself.

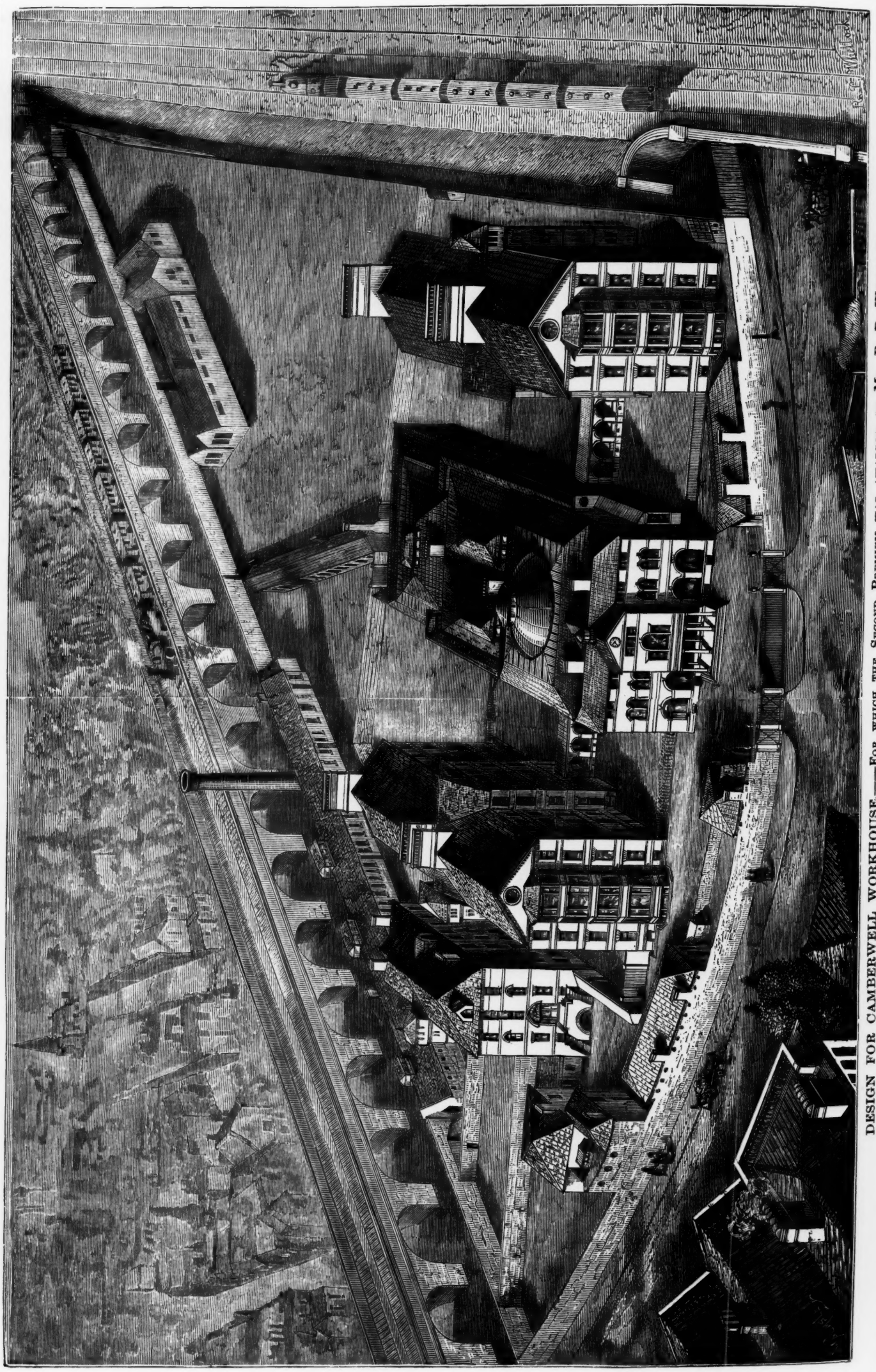
The lavatories and w.cs. to the main blocks are cut off as much as possible from the buildings, and cross ventilated. These also are terminated with ample water-tanks for the supply of them, and for that of the fire hydrants to each floor.

The subsidiary buildings, as the probationary wards, engine-house, laundry, tradesmen's shops, &c., are placed in the most convenient spots that the site would allow, together with a proper drive to connect the whole, and to supply the means of delivery and removal of coals, stores, and other necessaries.

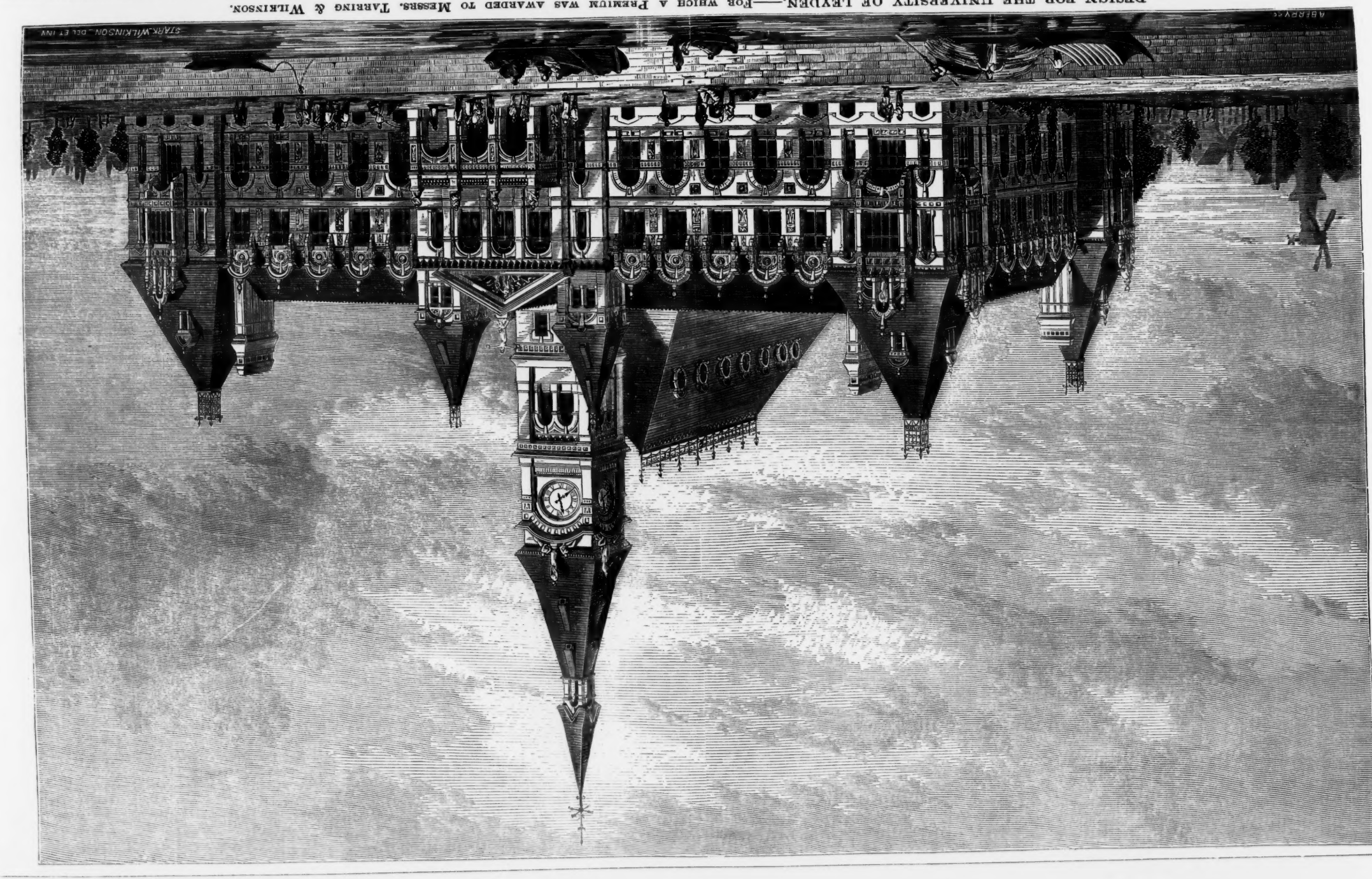
The heating apparatus proposed was the



DESIGN FOR CAMBERWELL WORKHOUSE.—*Plan.*



DESIGN FOR CAMBERWELL WORKHOUSE.—For which the Second Premium was awarded to Mr. R. P. Wellock.



DESIGN FOR THE UNIVERSITY OF LEYDEN.—For which a Premium was awarded to Messrs. Tarring & Wilkinson.

Gurney stove, with Woodcock's improvements, and so arranged with a system of ducts or fireproof flues as to supply at pleasure any or all the wards and principal apartments throughout. These ducts were to be formed in the walls as carried up. The whole was so contrived that the apparatus could be cut off entirely from the general traffic. A simple cottage-grate, however, and flue were provided for each ward.

The ventilation was obtained partly by a system of inexpensive sunburners with foul-air extractors, with inlets for fresh air.

Cross ventilation is provided as far as practicable to each ward by means of the ordinary windows.

The elevations are shown grouped in isometrical perspective, to give a better idea of the site, which is peculiar in form and position. The author has chosen for his main front a line nearly parallel to the general chord-line of the curve formed by the roadway. The neighbourhood being a respectable one, and the whole site overlooked by two important railways, he was much influenced by this consideration to render the design as agreeable in appearance as possible, consistent with convenience and strict economy. The style is easy Italian, suited to the nature of the structure.

As to materials, it was proposed to build with good grey stocks, slightly relieved with red stocks to openings, &c., the roofs to be covered with the Broomhall Company's tiles, except where metal was necessary; and internally the construction was to have been Homan & Phillips's fireproof arrangement for floors.

The necessary engineer's works, gas and other fittings throughout, were included in the architect's approximate estimate of 49,000*l*.

The author of this design is Mr. Robt. P. Whellock, A.I.A., of Camberwell.

UNIVERSITY OF LEYDEN.

The architectural taste of the public in Holland has lately been undergoing somewhat of a revival, and although many are opposed to the introduction of novelties, some are energetically endeavouring to promote more artistic views than have for some time obtained, and with this object one or two exhibitions have been instituted.

Last year the Government consented to offer premiums in a competition open to the world for a proposed new university building at Leyden, the professors in that town feeling that the existing buildings were inadequate for their purposes.

As a result, thirty-six sets of designs were sent in from various nations under motto, and the jury appointed proceeded to examine them and reduce their number to eighteen, as being superior to the others, and worthy of a stricter examination. These were reduced to seven, and of these two were afterwards found to be inferior to the remaining five, which were marked as follows, — "Vivat Academia"; "Quis"; "Eigen Kunst is eigen leven"; "Qui hazarde gagne"; "Art et Science." Between the authors of these five the amount of the two premiums offered was divided equally. The design named second we illustrate in our present number. It is by Messrs. Tarring & Wilkinson, architects, of Basinghall-street, London.

The plan of the warming and ventilation, to which the instructions called special attention, was arranged by Mr. Wilson W. Phipson.

The total cost of the building was limited to between 80,000*l*. and 90,000*l*., but there is no immediate prospect of the building being carried out.

The design now illustrated endeavours to give a broad and dignified elevation, the details of which, executed in red brick and terra cotta, are freely treated on the basis of some of the old characteristic Dutch architecture.

The plan is carefully arranged to give convenient access to all parts, and freedom of circulation between the various class and lecture rooms and the central students' hall, the ground floor of which is occupied entirely by them as a hall of conversation, having cloak and hat rooms at one end and a buffet at the other. On the first floor of the central hall is the grand lecture-hall; and on the first floor of the surrounding ring of buildings are the whole of the examination-halls, and professors', senators', and curators' rooms, as required by the instructions.

The corridors are placed round two large open courts, from which they obtain plenty of light and air, and they give continuous access to all the various rooms and staircases.

A good staircase from the principal entrance is chiefly used by the senate and professors, and for the public on occasions. Four other staircases are more especially used by the students in proceeding from their class-rooms, which are arranged round the outer ring of the building on the ground-floor to their respective examination-halls on the first floor.

The class-rooms, examination-hall, and professors' rooms in each department of law, science, philosophy, medicine, and theology are placed in groups occupying the ground and first floors. A small lecture-room is placed in the centre of the south elevation on the first floor, contiguous to the corridors of approach appertaining to the great hall, having the hall-keepers' and porters' rooms and a public entrance underneath the same, and two students' staircases and entrance, one on each side.

MATTERS OF INTEREST FROM THE DUBLIN CONGRESS.

The Congress of the British Association, held in Dublin within the past few days, has been marked by a larger attendance than that known at any of its previous yearly gatherings. Of the President's remarkably thoughtful address we spoke last week at some length, and we also gave summaries of some of the papers read. We now give abstracts of such other papers read before the various sections as can be considered as coming within the purview of this journal.

Science and the Universities.—The Chemical Section was presided over by Professor Maxwell Simpson, who in his opening address expressed regret that the Universities of Oxford and Cambridge, with their splendid revenues, contributed so little for the advancement of physical science. He hoped that the day was not far distant when the fellowships of a few of them which now went to reward young men for merely passing a good examination should be given without reserve to men who had advanced human knowledge in any department. The Government should take into its own hands the appointments to all scientific chairs in the universities. It had taken primary instruction under its control, and quite recently in Ireland intermediate education to a great extent, and he trusted from that there was a disposition on their part to assume the direction of higher education.

Several papers were then read, including one by Dr. Wallace, who reported as to the best means of developing the light from coal gas.

Changes in Coast-lines.—In the Geographical Section, Dr. Phené read some notes on "Geographical Variations on the Coast of France." He drew attention to a new and important field of research in which French geographers had engaged. M. Ernest Desjardins was foremost in the work, and had published the first tome of a work in which littoral comparisons were given of the forms and dimensions of the coasts from the oldest sources obtainable, frequently going as far back as the first century of our era. The new branch of geography brought to light ports where kings and conquerors had embarked or landed, which were no more, sometimes being entirely washed away, with the former coasts evidenced often by the remains of submerged forests, or, on the other hand, found far inland silted up by the action of the sea. Such examples abounded along our own coasts. Thus, St. Michael's Mount, in Cornwall, was known in the old British language as the "Hoar rock in the wood." Old data fast being obliterated would obtain for such purpose a new interest, and instead of sinking into oblivion, or being classed with the dusty rubbish of an antiquary, would be read with a fresh and lively interest by modern men of science.

Kent's Cavern, Torquay.—In the Geological Section Mr. Pengelly read his annual report "On the Exploration of Kent's Cave," situated in a hill in the neighbourhood of Torbay, in Devonshire. A committee upon which he, with Sir John Lubbock and Mr. Boyd Dawkins, acted, had been appointed to explore it, and he now was prepared with the results. After giving the dimensions of one portion of the cavern, named the Bear's Den, Mr. Pengelly stated that on entering a chamber leading from it, the floor was found to be a complete pavement of blocks of limestone, some of them of considerable size. Their removal disclosed an almost horizontal bed of the typical breccia, the most ancient deposit yet found in the cavern. The chamber measured about 30 ft. from north to south, from 7 ft. to 13 ft. from east to west, and from 8 ft. to 13 ft. from the roof to the bottom of the excavation. The only objects of interest found in the chamber were four pieces of bone. He had in his possession over 7,000 boxes of specimens taken from this cavern. Another part of the cavern, called the Tortuous Gallery, yielded twenty-six teeth of bears, several of them in pieces of jaws; one tooth of the horse; several bones and pieces of bone; three bits of coarse, friable, black pottery, and a piece of black flint, in all probability to strike light. In the part of the cavern called the Undervault, were found forty-seven of the bear, thirty-three of the hyæna, and two of the fox, fragments of bone, and the greater part of a large quartzite pebble. Many of the teeth of both the bear and the hyæna were in jaws or portions of jaws.

Irish Land and Property Laws.—In the section of Economic Science and Statistics, Mr. Murrough O'Brien read a paper "On the Irish Land Act, asserting Mr. Bright's scheme to be the only feasible economic solution of the land question, if accompanied with an easier system of transfer. Mr. Monahan, Q.C., followed with an essay "On the Codification of Law as to Sales of Property." Dr. Hancock mentioned some impediments to the prompt carrying out of some of the principles conceded by the Legislature in the Irish Land Act, and Mr. F. Nolan read an essay "On the Creation of a Public Commission to Purchase Land for Resale to Occupiers in Ireland."

Irish and Cornish Prehistoric Monuments.—In the Anthropological Section, Miss A. W. Buckland read a paper entitled "The Prehistoric Monuments of Cornwall as compared with those in Ireland." She stated that archæologists were of opinion that the prehistoric monuments of Cornwall were the work of the same race as those of Ireland. In both countries the monuments consisted of tumuli (including chambered barrows and giants' graves), monoliths, circles, cromlechs, and holed stones (all probably sepulchral), and hut circles, cliff castles, curious caves, and crosses; whilst in Ireland raths and round towers were to be found. Long barrows were regarded as belonging to the Stone age. As these were found only in the bronze period in England and Scotland, it was inferred that the people of those countries at that time had not inhabited either Ireland or Cornwall. The mode of interment in Cornwall was chiefly by cremation. The late Sir William Wylde believed that the earliest graves in Ireland were gigantic cromlechs covered with earth. Circles in Cornwall were small as compared with Stonehenge, Avebury, and Carnac. Nine existed in the extreme west of Cornwall, but no avenues were traceable in connexion with them, and the same fact had been noted of the Irish circles. The Cornish cliff castles and Irish raths were both ascribed to the Danes, but they essentially differed in construction.

Drainage of Fens.—In Section G, Mr. W. H. Wheeler, of Boston, read a paper on the drainage of the Fen land, considered in relation to the rivers of Great Britain. The subject was treated in the paper under the three heads of Engineering, Administration, and Finance. Under the first head it was sought to be shown that the object of all future legislation should be not drainage only, but the regulation of the water supply. The circumstances of our rivers having been altered by the modern system of drainage, it becomes necessary to adapt their channels to carry a vastly-increasing supply of flood water at uncertain and distant intervals, and during the intervening period to discharge the diminished regular supply in such a way that the channel may not become choked by reeds and shoals, yet be made available for storing a supply of water in lieu of that which formerly percolated slowly through the soil. To effect this, a modification of the plan and waste lands, adopted by the old engineers, is suggested, the river proper being adapted for the ordinary summer and winter flow, and the flood banks to be set back sufficiently distant from the channel to leave a cess or margin to receive the flow of the greatest floods. The space left between the ordinary channel and the banks being only covered by water occasionally, would, like the waste lands, afford valuable pasturage. Each water-shed of a main river should be subject to one Conservancy Board. The whole water-shed being divided into districts, the area of which is to be determined by the water-sheds of tributary streams or other physical channels;

the sub-districts are to be placed under the jurisdiction of commissioners, elected by the occupiers of the land in proportion to their rateable value, and who shall have the charge of all local interests; the general Conservancy Board to be elected from among the members of the district Boards. The means of carrying out improvements required for future administration and maintenance should be raised by a tax on the rateable value of the whole area of land within the watershed, whether rural or urban; as every acre of land receives and contributes its quota of the rainfall, so it should fairly provide its share of the cost of maintaining the channels for carrying this off. The objection that high lands can never be injured, and are so far away from the flooded districts that they do not require any improvement of the river, is met by the answer that it is owing to the drainage carried out on these very lands that water is poured so rapidly into the river as to cause the floods, and they ought, therefore, fairly to contribute towards the remedy, for the evil they have caused.

The Land of Midian.—Captain Burton read a paper on this subject. All who read their Bible, he remarked, are familiar with such phrases as as "vexing the Midianites," and "Midianitish women," but they did not know how hazy on the subject of this grand old land the public of England was before the spring of 1877. About 1249 B.C. the Midianites regained their former power, but after the crushing blow they subsequently sustained, they fade out of Holy Writ, and their land becomes almost unknown. Josephus's mappers recognised two Midians, whereas there has never been more than one. Voltaire made a mistake about Midian, placing it on the eastern half of the Dead Sea, and considering it a little canton of Idumea about eight leagues long. Captain Burton described the exact limits of the country, and then proceeded to narrate his expeditions and discoveries, a detailed account of which he said he would publish about next November. Both expeditions which he had the honour to lead were sent out by the Khedive of Egypt, to whom we are indebted for our present knowledge of a neglected and most mythical country. In 1877 the Khedive placed under his command the first expedition. This preliminary visit lasted little more than a fortnight, but it gave him a fair general view of the country, and he brought back specimens of most of the metals mentioned in the Book of Numbers. In February, 1878, he returned to Cairo, and organised a second expedition on a larger scale. They first explored Northern Midian, and discovered a number of catacombs and many inscriptions very deeply cut, but not easy to decipher. One cutting he found was like St. George and the Dragon, but St. George was without his horse. Photographs of the catacombs and inscriptions were exhibited by Captain Burton. On the Gulf of Akabah the expedition was very nearly wrecked, the wretched boiler of their steamer having struck work, and they were only saved by the exertions of their Scotch engineer, David Dougall, who managed to start the engine again when they were drifting rapidly on to a reef of sharp rocks, and were just fifty yards off. But after this the Khedive was good enough to supply them with a better ship. Their explorations in the interior were at one place interrupted by the hostility of the tribes, who would not permit the expedition to enter their territory without paying a fine equal to about 100*l.* each per diem. On the 25th of February, therefore, they were obliged to retrace their footsteps. Proceeding in another direction they found old smelting-furnaces, and caves which might have been catacombs, and a great aqueduct. They were astonished by traces of immense labour, which yielded not a single line of inscription, nor even a mason's mark, to determine the race of the labourers. He was able to identify some of the places with those mentioned by Ptolemy. Turquoise was a favourite gem among the Bedouins, and judging from a large one he had seen inserted in the stock of a matchlock, which had probably been there for fifty years, they were not liable to change colour. The exploration of South Midian was the most interesting. Photographs were taken of old mining works, and in some of the minerals they found silver visible to the naked eye. Pathetic indeed is the view of the desolation of Midian. Once the Arabia Felix of the ancients, it has now become Arabia Petræa, Arabia Deserta. Under Roman rule it contained 20,000,000 of souls. Now the population was reduced to 2,000,000. He had full and perfect faith that Midian, like many other provinces, would presently awake from her trance,—from her sleep of ages. Midian contained a mining region 300 miles in length, and of equal depth, and he had but little doubt that what the ancients worked so well we moderns could work better still, so that Midian might look forward to the development of her mineral wealth.

Cyprus.—In the Geographical Section, Major Wilson read a paper on Cyprus, in the course of which he dealt with the natural characteristics of the island. Dealing first with harbour accommodation, which he conceived to be a matter of special interest to Great Britain, he said that Cyprus possessed no good natural harbours. The chief places of trade, namely, Larnaca and Limasol, were no better than open roadsteads, whilst Salamis and Famagosta were only artificial harbours, although the last-named was capable of being made into a substantial place of refuge. Famagosta was, he said, considered a good harbour by the ancient Greeks, but we must not forget the difference in the size of the ships used by the ancients and those of the present day. He pointed out that a harbour which was sufficient for Greek galleys would not do for English steamers and men-of-war. Turning to the question of population, he stated that it did not exceed 144,000, of whom 44,000 were Mohammedans. He described the disafforesting of Cyprus, pointing out that the poorer the people became the faster the timber disappeared, until the finishing touch was given by Mahommed Ali, partly for sale and partly for shipbuilding and exportation to Egypt. This destruction of the forests had conduced materially to the unhealthiness of the place; and another cause of unhealthiness was the running to waste of the water at the eastern end of the great plain, where the water collected and formed marshes, producing low fever. The rivers did not always reach the sea, but spread themselves out in marshes, and this gave rise to a certain amount of fever, though not of a very serious type. Major Wilson suggested that one remedy for fever would be to plant the eucalyptus, or Australian gum-tree. Having touched upon the minerals of the island, he finally recommended that the Government should send out, as soon as possible, a scientific expedition to make, first of all, a topographical survey of the country in conjunction with the geological survey, and an examination of the ancient mines, as it was possible that in the limestone districts cave deposits would be discovered similar to those Mr. Adams had found at Malta.

Dr. J. S. Phené, F.S.A., read a paper on the "Courses of Migration and Commerce, traced by Art Relics and Religious Emblems." In this paper references were first made to some remarkable sculptures of the oldest historical notice, existing in the mountains of Asia Minor, particularly the "Niobe" of Homer, on Mount Sipylus, and the Sesostris figure at Nymphio, and subsequently to the various colossal and other rock-hewn sculptures in the Sporades and Cyclades, having affinity, by similarity of style, to those of Asia Minor. It was then mentioned that according to Strabo, tradition showed that the religion of this part of Asia Minor was transferred to the south of Gaul, in the ancient city of Massilia, now Marseilles, and thence consequently it spread over the west of Europe; that this religion brought with it the idea of the colossal in representation, which probably accounts for the ancient colossal figures in Brittany and Britain, and the love for the colossal still found over the whole of that part of France lying between Marseilles and Brittany, the old route of tin traffic between Britain and the Mediterranean. Still-existing Phœnician customs were referred to on the same route, and then references were made to some discoveries on this route, and in the south of Britain and the south of Ireland, which tended to the conclusion that the articles discovered were introduced by Oriental, probably by Phœnician, traders. One of these was a sculptured human head in the exact style of Assyrian art, as found at Nineveh, and which was discovered some slight distance under the surface on the estate of the Earl of Mount Edgcumbe, who had drawn the attention of the author of the paper to it, and furnished him with a photograph. Another was a bronze mask or head found in a bog in the south of Ireland, near the Galtee Mountains; it was the property of Lord James Butler, by whom the particulars and a photograph were furnished to Dr. Phené, with a request that he would give his attention to the matter, and throw what light he was able on the subject. The bronze represented the head of a cow, and had a close resemblance to the head found by Dr. Schliemann at Mycenæ, which he identified as the head of Hera. This head was examined by Dr. Phené at Athens, every facility being afforded him by the Greek Government. The Mycenæ relic was a silver head with golden horns, and the head found in Ireland was a bronze one, with the horns (missing) made to take on and off, thereby clearly indicating that they were capable of being taken off for security, and were therefore, no doubt, also golden. Both the heads had the sun disc on the forehead; but the bronze one, which he considered was evidently of Phœnician workmanship, had also the emblem of Astarte or Ashtoreth, the Sidonean deity, on the forehead. In the mask found in Ireland the tongue protruded, indicating sleep or rest, and this symbolism was further exemplified by the crescent moon being placed beneath the sun-disc, and so indicative of her rest or sleep, a strong similitude when taken in connexion with the well-known appeal to the priests of Baal, who must have represented their deities in action or occupation. "Cry aloud, for he is a god; either he is talking, or he is pursuing, or sleepeth, and must be awaked." Dr. Phené, who had gone over the whole districts referred to in Asia Minor, Greece, the Levant, and the complete course in France, found a cow's head sculptured in the island of Paros, and another on part of an ancient temple now forming the lintel of a Greek church, near Amyclæ, not far from Sparta. Another object of great interest was represented, as were all the others, by a fine photograph representing a bronze figure of a deity, shown to be the Tyrian Hercules, found at Vienne, near Besançon, not far from the old route referred to, through Gaul. This deity bore on its head an enormous crown composed of hammers, the number of which agrees with the united number of the Kabiri of Samothrace and the Cyclopes of Sicily, their occupation being the same, viz. that of metallurgists. The attitude of this deity and the vessel he holds in his right hand agree with the representation of one of the Kabiri on a coin of Pergamus.

Next Year's Meeting-place.—At a meeting of the general committee for the purpose of determining the places of meeting in 1879 and 1880, and for appointing the officers and council for the ensuing year, invitations were read,—one from Sheffield, requesting the Association to meet there in 1879, and another from Swansea, asking the Association to meet there in 1880. It was resolved that the next meeting of the Association should be held on the 6th of August in Sheffield, and in Swansea in 1880. Professor Huxley moved, and Professor Flowers seconded, that Mr. George T. Allman, F.R.S., be appointed president elect for the meeting at Sheffield.

THE CASTLE AT CASTLEACRE.*

The remains of Castleacre Castle have an interest apart from their picturesque beauty. They present features of great value, which, we may notice, are of different ages. So evident is this, that many diverse opinions have been expressed, and much speculation has been ventured upon, to account for what is, in fact, the blending of the works of different dates. The progress of antiquarian science enables us to undertake our investigation with more certainty of arriving at the truth with respect to the age of the various parts. Let us examine briefly the opinions, first, of our predecessors. Passing over the speculations of early describers of Castleacre, we are indebted to the painstaking researches of Mr. Harrod for an admirable description of the remains in a work of no small value to Norfolk antiquaries. The nature of the earthworks attracted his attention, and he was satisfied that the rectangular enclosure of the outer ballium, enclosing the village, was of very different construction to the circular-formed earthworks abutting upon the angle forming the castle proper, the inner courts, and the raised mound of the keep. Then, again, the masonry walls built on these inner courts and those of the shell-keep itself at once testified to a different period for their construction. These he rightly assigned to William de Warenne, who kept his court here. Recorded history amply testifies to his having erected a castle here. Their Norman character testifies readily to this

* By Mr. Loftus Brock. Read at the British Archæological Congress, Wisbech.

date, apart from the analogy of the shell-keep before us to similar remains of the same date. Here we may note in passing, how readily in these days research has demonstrated that Norman keeps were not always rectangular, such as Rochester, London, Dover, and many others; but that they were very frequently circular, like Conisborough, and polygonal, like Tickhill, Lincoln, &c., and that the shell-keeps were common enough in buildings of Norman date, as they were in later ones, such as Trematon, Restormel, Windsor, &c. The rectangular enclosure of the outer ballium he rightly ascribes to the Romans. This is likely enough, for its rounded angles are analogous to the fortified camps so prevalent in the country, and the formation of the banks and ditch testifies to a regularity of construction not to be found in any but Roman works. In addition, Mr. Harrod discovered Roman pottery in the bank abutting upon the mound of the keep; and it may be noted in support of this Roman origin that the Roman road, the "Pedder Way," leads in a line straight for miles direct from the north gate towards Hunstanton, or rather to the station at Brancaster. These facts may assure us that the banks enclosing the village were the enclosures of a Roman or Romano-British town. Its history is unknown, its name has passed away, and the assurance that here is a Roman site waiting for identification may stimulate local antiquaries to fill up this gap in our knowledge. The circular mounds call for our special attention. Mr. Harrod points out their junction with the rectangular earthwork, and argues that they were in existence prior to the latter, which was therefore modified, and its lines formed up to them, that they might be attached to and form a portion of the stronghold. The effect of this would be to give a British date to them. He says:—"The Roman construction of the site being established, how can the very eccentric form of the works be accounted for? It will be seen that the west bank, of Roman construction, is perfectly straight, the north and south banks do not run at right angles with it, but incline inwards; the northern are bending considerably at its eastern extremity to join the circular work."

Our associate, Mr. Vere Irvine, whose decease was so greatly deplored, and whose acquaintance with ancient earthworks was probably inferior to that of no other investigator, prepared a careful plan of these remains, and has given a lucid description in an early volume of our *Journal*. He points out that the circular works, instead of having caused the modification of the rectangular ones, have, in fact, been formed up against them, thereby proving the prior existence of the latter. He assigned a Saxon date to the mounds.* An examination of his plan, side by side with that of Mr. Harrod, and with the remains, is convincing that the former is the more correct of the two, and that the circular earthworks have been formed against the older rectangular ones, and in part beside them. Are these mounds, therefore, Saxon, or may they not be of the same Norman date as the ivy-clad walls upon them? Here the researches of recent years come to our aid. It enables us to answer Mr. Harrod's inquiry. He asks, "There is no doubt of the castle having been erected by the De Warennes, but did they construct the enormous earthworks of which I have spoken as the south-east angle?" Similar mounds to this are found all over our country, sometimes destitute of all later masonry, sometimes crowned with building of Norman date, as in this case. We also possess a vast number of smaller mounds, probably the remains of dwellings of smaller class. I proceed to show by inference and analogy with some of these examples elsewhere, that these mounds are of Saxon date, and that their formation is altogether irrespective of the late buildings which have been adapted to them. Norwich is known to have had a castle in the seventh century. The present building has no relation to the older plan of the circular earthworks upon which it stands. Lewes Castle, built by Earl Warenne, who erected this, has a similar earlier mound. This castle was the principal stronghold of the Rape of Lewes, one of the primary divisions, the six Rapes of Sussex, each of which had a castle in Saxon times, in each case occupied by the later masonry castle of the Roman possessors. At Chichester the mound remains; at Arundel and Lewes they have the shell keeps of Norman date. In addition to the above, Saxon strongholds are known to have existed at Tamworth, Windsor, Builth, Launceston, Warwick, and a multitude of other instances, and in all these cases the mounds exist with buildings of later date above them. The mounds alone, in a deserted state, and apparently never covered with later masonry, exist at Mexborough, Brenchly, Earls Barton, and many other places.

It is not generally known that there exists at Ely a remarkable earthen mound. It stands due south of the south transept of the cathedral, and in a line east from Ely Porta. It is separated from the buildings of the cathedral by a well-defined valley, crossed by a raised causeway, now the well-known approach to the south side. It is shown in Buck's view, and called "Mill Hill," and most probably a mill stood on it in former times. It is now called "Cherry Hill." Like others of its class, it is circular in form, and a winding path leads around it from its base to its summit, where it presents a level platform, 60 ft. in diameter. Its height and extent forbid us to conclude that it was ever thrown up for the base of a mill, and a short examination of its position suffices to convince that it is the site of an ancient castle, built for the defence of the monastery. This is not the site of the castle built by Bishop Ingellus, 1133, which stood elsewhere. It has no recorded history, but we have these facts to guide us. It stands close to the site chosen in Saxon times for the monastery, and has evidently been placed there for the defence of the latter; it was not used in Norman times. We know that the nunnery had no defence when ravaged by the Danes, and it is reasonable to assume that it was one thrown up to prevent a similar catastrophe on the re-foundation by King Edgar, or one of the fortifications made by Hereward, the last of the English. There exists also a mound very similar to the last, little known, about a mile from Middleton Towers, on the road to King's Lynn. It is larger, loftier, and has a perfectly defined outer rampart and small ditch outside the main ditch, at the base of the circular mound. The path winds around the circular hill quite up to the summit. The height is fully 90 ft., the ditch is fully 40 ft. across, and 15 ft. deep, while the outer ditch is 8 ft. wide and 5 ft. deep. The ascent is very steep, and the fortifications, surrounded with palisades, must have offered a formidable resistance to a foe. At Laughten-in-the-Morthen, the deserted Saxon mound is not unlike that at Tickhill. Both belonged to the same Saxon owner, but only Tickhill became the site of a Norman dwelling. It may be noted that these mounds do not appear in the purely Norman type of castle, such as Rochester, London, Dover, Scarborough, Carlisle, Newcastle, Richmond, Canterbury, &c. These were built mostly on level ground. At Guildford, the Norman keep is only partially built upon an earlier mound. At Porchester, a very small mound is banked against the Norman walls, and at Conisborough and Scarborough the bases of the keeps are sloping in masonry, as if carrying out the tradition of the earlier mounds of earth. The number of these circular mounds and ditches on Saxon sites, indeed, is so great that we cannot close our eyes to the evidence of their almost uniform plan; while the varying form of the Norman keeps is valuable as evidence that the Norman builders, recognising the importance of retaining the strongholds already formed, simply adapted their works in masonry to suit the form of existing mounds. To such an extent was this done, especially with the shell keeps, the form of which more readily accommodated itself to that of the mounds, that it will be difficult to find an example of one apart from the presence of the earlier mound. We may therefore take it for granted that the Saxon stronghold was a mound surrounded with a strong enclosure of wooden palisade, and several ditches of greater or less depth; and that at a later (Norman) date the palisades were removed, and masonry works substituted.

From these remains we may form a graphic idea of a Saxon Thane's mansion; we reconcile the earthen remains to the descriptions of so many early writers who speak of a constant use of timber in such dwellings; and we may realise the view of such a dwelling as is pictured in more than one Saxon MS.*

While we may believe that a Saxon stronghold was almost always of this description, they afford us sufficient reason for not withholding our assent to the dictum that there were no castles in England until the Norman conquest, as has been stated, nor are we without evidence that even walls were occasionally used.†

It is not to be understood that Norman castles and dwellings were never erected on mounds of the same date. Possibly in some cases this was so, but probably so only very early in the Norman occupation. In Normandy we know it was so,‡ and the custom in its general arrangements may have been tolerably universal up to the eleventh century in England and on the Continent as well. Indeed, we may withhold our opinion whether or not the square keeps proper were not originated by the Normans in England rather than by them in Normandy. The sudden increase of wealth consequent upon the conquest gave the Norman settlers here ample means of gratifying their taste for fine buildings, and the constant references to the erection of stone castles by the old chroniclers is amply borne out by the remains still numerous in England. It furnishes us with a sufficient reason for believing that after the first few years at least of the occupation of England, they discarded the plan of construction with mounds, ditches, and mere palisades, common alike in Saxon England and Normandy, for the durable works in stone.

THE TUMULI OF THE FENS.§

Amongst the relics of antiquity remaining in the Fens, few have caused more discussion, or been more fruitful in differences of opinion, than the mounds generally called tumuli. Some have considered them to be beacon hills, others have classed them as sacrificial mounds, as sepulchral monuments, or as places of refuge from the floods, while another idea has been that they are more recent erections for windmills or pleasure-mounds. As, however, their existence has been certified by Dugdale 200 years since, when their origin was as much a mystery as now, the two latter suggestions do not appear probable; although the use of ancient embankments as the site of wind mills is not unfrequent. Two good examples are to be seen on the Lynn-road, erected on the remains of the old sea-bank, one of them the fine mill called the eight-sailed mill. The earliest mention I have discovered of a tumulus in the Fens is in the life of Guthlac, about 700 A.D., who, we are told, found on arriving at Crowland a green mound that had been opened by treasure-seekers. . . . . Another mound close to the Smeeth-road Station, between Lynn and Wisbech, has also a traditional interest. It is called the giant's grave, and the inhabitants relate that there lie the remains of the giant slain by Hickathrift with a cart-wheel and axletree. The mound has not been examined. It lies in the corner of the field, with a slight depression round it, and has now only an elevation of a few feet. A cross was erected upon it, and is to be seen in the neighbouring church-

* The occurrence of Saxon work is pointed out in a series of articles, of no small value to the investigation of this class of monuments, which have appeared in the *Builder* in recent years. Under the signature "G. T. C.," we can recognise the author to be an antiquary whose researches, so ably conducted for many years, have thrown considerable light upon castellated remains. He notices the Roman camps now forming part of the later castles at Brougham and Brough. Others could be readily added. The ancient sites, probably like that at Castleacre, were therefore used by the Romans, adapted by the Saxons, and finally by the Normans. He instances also the mound of the castle of Caerleon, which has been thrown up over earlier work of Roman date.—B.

* The Bayeaux tapestry represents one or two fortified places of timber, erected on mounds. One is being attacked, and while the assault is being made on one side, others of the assailants are endeavouring with torches to set fire to the woodwork. We should note that there are some few records of Saxon castles and fortifications being erected of stone. Part of the existing causeway at Tamworth is held to be of Saxon masonry, and the Saxon Chronicle records the surrounding of the burg at Towcester with a stone wall in the time of King Edward the elder.

† "G. T. C.," in his article on Eaton, Scoton, and Huntingdon, in the series already alluded to, notes the following characteristics of the work of this class:—"Not only is there a mound, but the level of the area contained within the inner ditches is generally higher than the land immediately around. This is remarkably so at Builth and Kilpeck among many others, and was apparently intended to give the domestic buildings greater safety, and an advantage when actually attacked. This distinction does not seem to have been pointed out, and it is possible that upon it may turn the identification of many of the earthworks the date of which is unknown."

‡ M. de Caumont, in his "Abecedare," discusses the construction and arrangement of several of the strongholds of some of the chiefs contemporary with William the Conqueror, and those of some who accompanied him to England. They are generally similar to what we should now unhesitatingly call Saxon. One has a close resemblance to the plan of Castleacre; others have so early an appearance as almost to raise the belief that the Normans may have utilised earlier works there as here. M. Viollet-le-Duc instances later works with the earthen banks of the Gallo-Roman period.

§ By Mr. Jonathan Peckover. Read at the Wisbech Congress of the British Archæological Association.

yard of Terrington St. John's, bearing the singular name of "Hickathrift's candlestick." The majority, however, of the Fen tumuli are in the neighbourhood of the Roman Bank. Messrs. Miller and Skertchley, in their recent work on the Fenland, gave a list of twenty-five in the district, twenty of which are within two miles of the ancient sea-bank. They infer accordingly, with some probability, that those who made the sea-walls made the tumuli. Only one mound is mentioned by them in Walsoken, but there is a second not far from the chapel-of-ease in New Walsoken, standing in the midst of the now deserted channel of the Ouse. This has never been examined carefully, and may have stood there in early times as a guard to the entrance of river, or be of more recent construction. . . . . Speaking of Marshland, Skertchley says that their churches are very beautiful, and here are, too, many such of the tumuli." Skertchley also mentions a mound at Elm, near which some Roman coins were found in 1713 of the later empire. The people had strange notions about it, affirming they frequently saw a light upon it in dark winter nights. It was probably situated in the field at the back of the Girls' School, where there are still remains of earthworks. In 1757 several human skeletons were found with the arms of a British warrior, an iron sword, spear, and umbo of a shield, &c., in a kind of tumulus between Chatteris Ferry and Somersham. Between Chatteris and Ely also are three in a triangular form, as stated by Watson in his History of Wisbech. Sir William Dugdale, the author of the History of Embanking, in writing to Sir Wm. Brown, states that while journeying through Marshland (about the middle of the seventeenth century) "he had come across several mounds which he hoped would be explored to ascertain what historic evidences they contain." Two hundred years elapsed, and it was not till 1865 that any antiquarian exploration was made, when the Rev. John Davies, the then rector of Walsoken, superintended the opening of a mound situated to the north of the parish church and by the roadside. He informs us that 2 ft. from the summit sheep-bones were found and several pieces of wood imperfectly charred; 4 ft. lower other bones, and a piece of metal, described by Mr. Davies as the iron handle of a sword, were exhumed. No human remains were discovered. I believe Mr. Davies was inclined to consider the mound to have been used for sacrificial purposes, as the western slope was much more sloped than the eastern. The relics found in the operations are deposited in the Wisbech Museum. No further search was made into the interior of the tumuli until it was suggested by the Rev. Frederick Jackson, of Parson Drove, that the coming of the Congress to Wisbech offered a specially favourable opportunity for further exploration, and a committee was formed to examine the Leverington mounds. Their report gives the more minute details of the work, and although they failed to discover anything which would certainly explain their original purpose of the tumuli, some light has been thrown on the subject. In neither mound have human remains been identified, nor any very ancient pottery, although fragments of vessels glazed and unglazed were not unfrequent. Mr. Sharpe's mound, called "The Rabbit Hill," is 101 ft. in diameter, and 20 ft. high. That in Mr. Webster's field is 10 ft. in diameter and 10 ft. high. The older inhabitants have a belief that the former is sepulchral, and that ghosts haunt it, and the more superstitious dread to pass it at night. It has been constructed carefully with alternate layers of silt and clay, stiffened with water, and the foundation was found 4 ft. below the present surface of the land, standing on a bed of sandy silt, 1 ft. deep. This rested on a thin bed of blue clay, 1 ft. 4 in. in thickness; at the edge of the mound the same stratum was reached, without the superincumbent silt, at a depth of 4 ft. from the land level. In both cases the foundation stood on the bare surface, without trace of herbage. In the centre the "made earth" was distinctly visible, resting on the water-formed beach. The same was found to be the case in Mr. Webster's mound, but there the foundation in the centre was reached 1 ft. below the present land-level, resting on sandy silt of uneven surface, 4 in. or 5 in. deep, beneath which was the layer of blue clay, 1 ft. 4 in. thick. This layer was found on the south-west side, in the field, at the depth of 2 ft. 7 in., and on the east side at the edge, at the depth of 5 ft. 6 in. From this we may gather that a natural rise was chosen for the site of the mound, and that it was erected on unenclosed land washed by the tides. The pottery and bones found in both these tumuli are deposited in the Wisbech Museum. But the difficulties of coming to a conclusion as to the date of erection are much increased by the numerous rabbit-burrows running deep into the interior, many fragments of quite modern china having been found introduced by this means. A mound in Tyd St. Giles parish, in Carrow Field, not far from the site of Dunton Hall, was levelled by the tenant this spring, and a curious specimen of pottery, in good preservation, exhumed. It is in the shape of a jug, round the neck rude frog-like ornaments, and the body of the vessel has a pattern like fishes' scales. This singular relic has been lent to the Museum during the sittings of the congress, for the inspection of the members. These mounds are not unfrequently in pairs. There are two at Walpole and Fishtoft, and there were two at Fleet, in a like position. One of the latter has been demolished, but it bore a considerable resemblance in shape to Mr. Sharpe's mound, while the remaining one, now overgrown with trees, has a similar form to Mr. Webster's. It is very probable that there was a tumulus in Wisbech itself, as an open space on the North Brink is still called the Low. These few notes of our present knowledge of the mysterious Fen tumuli are offered with the hope that they will aid towards the elucidation of the interesting problem of when, why, and by whom they were erected. It will be seen that all these tumuli are not of one class, and I would venture, in concluding, to arrange them as follows:—Firstly,—Burial mounds, such as that described near Chatteris, and possibly the Crowland Hill. Secondly,—Mounds with crosses, as the Giant's Grave in the Smeeth, and probably the Low at Wisbech, the White Cross, the shaft of which is still preserved in Bank House garden, having been erected on its site; and lastly, the mounds connected with the "Roman banks," whose use is at present undetermined.

ST. MARY-LE-BOW, CHEAPSIDE.

A FACULTY has been applied for to effect certain alterations and repairs to this church, and the Bishop of London has intimated his intention of granting such faculty as prayed in a notice affixed to the church-door dated August 16th, 1878, unless some valid reason can be shown to the contrary.

The alterations proposed consist of putting the main fabric of the church in thorough repair, repairing the roof, dormers, ceiling and its timbers; cleaning and repairing the walls externally; rebuilding the parapet wall on the east side of the vestibule, and repointing it; the repair of the tower and lower part of the spire, involving, so far as can be ascertained, the following works, viz., the resetting and fixing of the vases at the angles of the upper stage of the spire, the pointing of the flying buttresses, repair of the flat and trap door at the top of the central staircase, and the covering of the flat with lead; the repair of the balcony in Cheapside and its railing,—this balcony, as we know, had its origin in the old "seldom" or shed in which our kings used to sit to see the jousts and ridings in Cheapside;—the cleaning and repairing of the whole of the stonework generally, and its repointing.

In the interior, the works proposed are the re-arrangement of the east end, and the formation of proper stalls for the clergy and choir; the removal and re-fixing of the pulpit; the removal of the whole of the present seats and the substitution of open benches of oak, or stained deal of suitable design; the remodelling of the reredos, or its removal and replacement by a new reredos of suitable design.

The estimated cost of the works in contemplation is 5,000*l.*, to which the Ecclesiastical Commissioners have agreed to contribute 2,000*l.* out of the proceeds of the sale of the site of Allhallows Church, Bread-street, recently sold under the provisions of the Union of Benefices Act.

The architect is Mr. Arthur Blomfield, M.A.

The Recent Floods.—At Lowestoft much damage has been done by the flooding of houses in the lower part of the town owing to the inadequacy of the sewerage. The Improvement Commissioners intend to construct a larger sewer having an outlet into the harbour.

THE BRITISH ARCHÆOLOGICAL ASSOCIATION AT WISBECH.

CONTINUING our account* of this, the thirty-fifth Congress of the British Archæological Association, we have to add that, on Thursday in last week the members left Wisbech in large numbers by special train for King's Lynn, where they were met by one of their vice-presidents, Sir Lewis Jarvis, and conducted by him to the Guildhall, where the maces, &c., belonging to the corporation were exhibited, and commented upon by Messrs. Bloxam, Lambert, and others. Mr. W. De Gray Birch gave an interesting account of several of the oldest deeds. The party next crossed over from the Guildhall to the Church of St. Margaret, a fine cruciform building, almost the largest parish church in England. It has two western towers, a central lantern, nave, transepts, and chancel. The earliest work was pointed out in the western towers, where Norman and Early English are strangely commingled. These portions of the edifice are very much out of the perpendicular. The church has some beautiful Early English work, but the greater bulk is of the end of the fifteenth or commencement of the sixteenth centuries, and, large as the present building is, it has suffered a great curtailment. About the middle of the last century the lofty western steeple and the central lantern were destroyed, and afterwards the aisles of the church were rebuilt in a very plain and reduced form. All this and much more Mr. Loftus Brock pointed out; and Mr. M. H. Bloxam called attention to the beautiful and well-known brass, now placed under one of the church towers. The party, on leaving the church, inspected what remains of the monastic buildings on its south side, and, following their guide, passed through the gateway and only existing feature of the Whitefriars, at the end of a long street in which were some interesting specimens of ancient domestic architecture. The visitors then walked along the sites of some of the old fortifications, and came at last to the Red Mount, so called from a singular little octagonal chapel, built of red brick, standing upon it, and having inside, on the topmost floor, a small shrine-like chapel of stone, in the form of a Greek cross, the roof being richly panelled. The peculiarities of the building were pointed out by Mr. Loftus Brock, who said that it is known to have been a Guild Chapel, and dates from the close of the fifteenth century; but the mound on which it stands, probably a tumulus, was called at an earlier period the Lady Mount.

After visiting the Custom-house, the party proceeded to the remains of the Grey Friars' Church, consisting of a Perpendicular tower, hexagonal in form, and standing on four arches of the Decorated period. Here the Rev. Mr. Slight gave some account of the old buildings that once stood on the spot, and the party then made an inspection of the Chapel of St. Nicholas, a building of considerable extent, height, and regularity, of the fifteenth century. After partaking of luncheon at the Globe Hotel, the company, joined by a large addition of visitors from Hunstanton and other places, set off in carriages to Castle Rising, which was fully described by Mr. Brock.

Afterwards the party drove to Sandringham, where, by permission of the Prince of Wales, the party wandered through the grounds and inspected the house, and afterwards returned by special train to Wisbech, where an evening meeting was held in the museum, the following papers being read:—"On Hereward the Saxon," by Mr. S. H. Miller; "On Some Reminiscences of an Old Scholar of King's Lynn Grammar School," by Dr. Phené.

On Friday visits were paid to the ancient Abbeys of Thorney and Crowland. Thorney is remarkable, on many accounts, beyond the monastic remains. The Anglo-Saxon Chronicle tells us it was founded as far back as 662, by Saxulf of Medehamshead, which we know as Peterborough. The Danes ravaged it in 870, and in 972 it became an abbey after the Benedictine type. The first Abbot of Thorney occupies a place in the history of English art as the author of a MS. volume of drawings and tracery known as the "Benedict of Ethelwold," which is preserved at Chatsworth, and the work is thought to have been executed by his chaplain, Goodman, who also was Abbot of Thorney. The abbey thus founded by Ethelwold lasted till

* See p. 892, *ante*.

the Conquest. On November 13th, 1089, the new edifice was completed, and, according to Ingulphus, the historian of Crowland, there were a great company and many celebrities present. Ten years later, on St. Luke's Day, the towers and spires on the west front were completed. These have long since disappeared; but one is referred to in a survey of the abbey made in Queen Elizabeth's reign. Thorney Abbey is small in comparison with Crowland, and incomplete, also, consisting only of an ancient nave, to which two transepts were added about forty or fifty years ago, in what was intended to be the same style. The village has been almost entirely rebuilt by its owners, the Dukes of Bedford, within the present century, and it exhibits all the signs of a model village, having in it neither an hotel nor a beerhouse. The chief features of the church were made the subject of an interesting paper by Mr. C. Lynam. Its substance was to the following effect:—At Thorney, the nave of the Norman conventual church has been preserved. The west front is a fine specimen of Norman architecture, and has a noble Perpendicular window set between the original square turrets. It is supposed to be of the early part of the twelfth century. The nave arches and triforium are perhaps a century earlier; the clearstory, unfortunately, has been destroyed, and the arches walled up; the aisles also have perished. There are in the windows some few specimens of German stained glass, and on the north wall is a tablet to Ezekiel Dance, a native of Compiègne, in France, who acted as pastor of a French congregation at Thorney, from their first settling there in 1652 to his death in 1674. The engineering skill of this little colony from France is still commemorated in the Fen country by the name of "French Drove."

From Thorney the visitors proceeded to Crowland, where the ruined abbey was discoursed of by the Rev. Canon Moore, who described the means that had been taken to maintain the central west front, with its remarkable array of statues. This work was carried out under the superintendence of the late Sir Gilbert Scott. The singular triangular bridge at Crowland attracted much attention. Each of its three parts spans a stream at the confluence of the Nene and its tributaries flowing towards Welland and Thorney village. It was erected about the year 1380, and is so narrow that it can have been designed only for pedestrians. In the afternoon the visitors proceeded on to Spalding, in spite of unfavourable weather. Here Canon Moore described the abbey church. The return journey to Wisbech was made in time for the evening meeting, at which Mr. E. Ferrey and Mr. Compton read papers on "Symbolism in the Early and Mediæval Art" and on the "History of Great Yarmouth" respectively.

On Saturday visits were paid to the Roman station at Caistor, near Peterborough (where Mr. T. Morgan read a paper); the castle at Chesterton, and the town of Stamford, where the visitors were shown the old Bede-house and other antiquities of the town, and were entertained at luncheon by the mayor and corporation. In the evening a *conversazione* was held in Wisbech, Mr. Birch exhibiting and explaining an interesting collection of MSS.

On Monday the visitors proceeded to Cambridge. At the Town-hall they inspected the civic regalia, which are very much like those of Lynn and Stamford, though larger and not quite so ancient. They were shown also some specimens of the royal charters granted to the borough from the days of the early Plantagenet kings down to the reign of Philip and Mary. In the Town-hall hangs a portrait of that worthy citizen of Cambridge, Mr. J. Hobson, who is immortalised by Milton, and who is known to the world by the phrase "Hobson's choice." Arriving at King's College, the visitors were received by one of the Fellows, the Rev. Mr. Churton, who showed them over the chapel, explaining the series of painted windows from west to east, the lower windows in their subjects corresponding as antitypes to those above. They also examined the design for a new reredos which it is proposed to erect behind the Communion table, and that of the new large western window by Messrs. Clayton & Bell, which is about to be put up in the chapel. After luncheon, the visitors went to the Fitzwilliam Museum, with the contents of which, as explained to them by Professor Colvin, they were much interested. A short and hurried visit to Peter House and to the Church of St. Mary-the-Less, and other visits at a later hour to Queen's and Corpus Colleges and their libraries, occupied the time till four o'clock.

The proceedings of the meeting were brought to a close on Tuesday, when the visitors proceeded to visit Clare College, Trinity Hall, and Caius College. After inspecting the well-known Gate of Honour, they were shown over Trinity and St. John's Colleges in detail. Of the former, the chapel, the master's lodge, and its grand reception-rooms and royal apartments, the hall, and its noble series of portraits, were hastily surveyed, a visit being then paid to St. John's College, where the new chapel, the work of Sir Gilbert Scott, was inspected. A walk through the gardens by the Cam, in the rear of the colleges, brought the visitors back, through the two quadrangles of Trinity, to the street in which is being erected the new Divinity School, a bequest to the university from the late Professor Selwyn. Thence a short walk brought them to the round church of St. Sepulchre. Between one and two o'clock luncheon was partaken of at Magdalene College. A visit was afterwards paid to the College Library. The rest of the day's programme included a visit to the Castle-hill, the old Fosse of Camboritum, and the Roman Wall hard by, whence the archæologists made their way to the so-called School of Pythagoras and to Merton Hall, and the excursion was wound up by driving to Jesus College to see its new chapel and other interesting features.

We have given but a very brief outline of the proceedings as a whole, electing to give space to the full text of some of the papers read during the proceedings. Papers by Mr. Loftus Brock on "The Castle at Castleacre"; by Mr. Peckover on "The Tumuli of the Fens"; and by Mr. Grover on "Ancient Reclamations," will be found on other pages of this week's *Builder*.

MATHEMATICS AND SCULPTURE.

SIR,—Allow me space for a word or two on your recent article on "Art and Mathematics," with the general tenor of which I very fully agree. Artists, no less than mechanicians, are indebted to Mr. Spottiswoode for the noble contribution which he has made to the general conception of mathematics as an ultimate form of our exact knowledge of nature, no less than for his protest against assigning an arbitrary limit to the range of possible discovery. But the point to which I wish to call attention is your remark "it is difficult at first to see how we can trace any similar connexion in regard to natural form as exhibited in sculptured figures." In one sense, and no doubt in the sense intended by the writer, this is no doubt true. If we were to seek, for example, for a mathematical expression for the series of curves which bound the human figure, within which beauty is found, and beyond which lie the limits of deformity, I think Mr. Spottiswoode would agree that we should entirely transcend the conceivable range of mathematical analysis. The same remark may also, to some extent, apply to the outlines of parts of the figure; though I apprehend that when we come to the several bones and articulations of the skeleton we may come within the province of geometric, or at least analytic determination.

This notwithstanding, personal experience in measuring many of the most important relics of Greek art has led me to the conclusion that, in the time of Phidias and Polycletus, so exact were the rules followed by the sculptor that they properly deserved the name of "canon." The proportions between the vertical dimensions of the best figures are so exact, that from the measurement of one or two of them, (as for example, that from the fontanel to the sternum) it is possible to arrive correctly at the height of the whole figure, if erect. And not only is this the case with the vertical proportions, but the girths are determined, with equal exactitude, by the length of the foot. This is equally the case in the Venus of Milo and in the Venus dei Medici, different as are the ideas of the two figures in many respects. The girth of the waist in each is exactly three times the length of the foot. The girths of the shoulders above the swell of the bosom, and of the bust, under the arms and around the bosom, are, in each case, exactly four times that length. The canonical length of the foot, for a slight graceful figure, is one-seventh of the height. When greater majesty or muscular power is to be indicated, the length of the foot is increased, and with it the whole system of girths. Thus the foot of the Venus dei Medici is 137-960ths of her whole height, if the figure stood erect. That of the Venus of Milo is 149-960ths of the height of the erect figure.

As we depart from the purest age of Greek sculpture this exactitude of proportion disappears. Roman copies of Greek works are mostly there or thereabouts, never accurate.

The study of the Greek canon, which presents so unsuspected an illustration of such language as that of Mr. Spottiswoode, is one that will well repay the attention of the student. It is one that must underlie the competent execution of any such scheme of lectures on the antique as has been recently discussed in your columns. Above all things, it is instructive, as showing the consistence of exact mathematical proportion with the utmost grandeur that has anywhere been attained by human art.

Allow me, while on this subject, to add one line as to the proposal made in the *Builder*, p. 869, *ante*, by Mr. Cave Thomas, to collect, instead of casts, a series of autotypes illustrative of Grecian sculpture. It is not an unnatural suggestion for a painter or draughtsman to make. The wonderful force and beauty of some of the Roman photographs in permanent pigment may well excuse the suggestion. I have but one remark to make on it. Let Mr. Thomas take a pair of callipers, and endeavour, by their aid, to ascertain any sculptural dimension from a photograph. It will need but one or two trials to be convinced that, for sculptural instruction, these fine prints are of little value. Even were they in exact perspective, the attempt would fail. But as it is, to the calculable variation of perspective has to be added the incalculable and often enormous error of the aberrant refraction from the sides of the lens. A foot, or a hand, in the foreground of the print, becomes of disproportionate magnitude. We must have the round, and be able to make the student measure it, in order to give him any acquaintance with the fundamental principles of antique sculpture.

FRANCIS ROUBILIAC CONDER.

PREMIUMS FROM THE INSTITUTION OF CIVIL ENGINEERS.

THE originality, labour, and ingenuity displayed by the authors of some of the communications submitted to the Society during the session 1877-78 have led the Council to make the following awards:—

For Papers read at the Ordinary Meetings.

1. Telford Medals, and Telford Premiums, to R. W. H. Paget Higgs, LL.D., and J. R. Brittle, for paper on "Some Recent Improvements in Dynamo-Electric Apparatus."
2. A Watt Medal, and a Telford Premium, to H. Davey, for paper on "Direct-acting or Non-rotative Pumping Engines and Pumps."
3. A Telford Medal, and a Telford Premium, to T. Curtis Clarke, for paper on "The Design generally of Iron Bridges of very large Span for Railway Traffic."
4. A Watt Medal, and a Telford Premium, to Bradford Leslie, for paper on "The Hooghly Floating Bridge."
5. A Telford Premium to J. Atkinson Longridge, for paper on "The Evaporative Power of Locomotive Boilers."
6. A Watt Medal, and a Telford Premium, to Alfred Holt, for "Review of the Progress of Steam Shipping during the last Quarter of a Century."
7. The Manby Premium to E. Bazalgette, for paper on "The Victoria, Albert, and Chelsea Embankments of the River Thames."

Other medals were awarded for papers printed in the proceedings without being discussed, and for papers read at the supplemental meetings of students.

The Electric Light.—Mr. J. Hollingshead writes:—Seeing that Mr. G. H. Stayton's report on the electric light (I presume the "Joblockoff light") of Paris, is going the round of the papers, I have referred its statements to Mr. Mayer and the French scientific gentlemen whom I brought over from Paris to establish and manage the electric light (called the Loutin light), which I am burning every night in the Strand. Their answer, supported by elaborate details, is this: With machinery valued at 3,400*l.* they are prepared to light an area of 1,540 yards long by 44 yards wide, with 36 lamps, exactly similar to those we are now using, having all the admitted advantages of the electric light, and an illuminating power equal to 2,000 of our existing street lamps, at a cost of 10s. 6d. per hour for consumption and superintendence. Thus, in place of 109 gas-lamps, the public would get a lighting power nearly twenty times greater, at a cost of only five times greater than the present outlay. By reducing the number of lamps, and making other alterations, the illuminating power and the cost could be reduced at the same time, until the difference between the cost of gas and electricity would be equalised, still leaving immense advantages on the side of electricity.

A GARDEN OF SANITARIANS.

At the *déjeûner* which was given at the instance of the English delegates at the Paris Congress of Hygiene to a number of the Continental delegates, Mr. Edwin Chadwick, C.B., who presided, said:—This has been the largest Congress on the subject that I have yet known, comprising as it does between six and seven hundred members of different nationalities, amongst whom are delegates from remote countries, where we have never heard before of attention being given to public measures for the prevention of excessive disease and premature mortality. The assemblage is one that gives a light of progress throughout the civilised world. In my position, I feel honoured at the way in which our invitation has been met—when I see by my side M. Guineau de Mussy, the physician to the late royal family of France, whose high accomplishments London society regrets to have lost, but whose science is now being applied to important works for the sanitation of this metropolis. Before me I see M. Pietra Santa, the physician of the late Emperor, of whom whatever else may be said, it cannot be denied that he did much for the sanitation of Paris by removing masses of the "habitations of cruelty," as the psalmist calls them, and opening up new lines of external ventilation, and this he did, though this was but a first and comparatively easy step in sanitation, of which a great amount of more difficult work remains to do, which it is to be hoped the present Government will follow the light of science in doing. I may welcome here Dr. Sapolini, the distinguished physician of the King of Italy. Most welcome is a delegate from Rome—from Rome, whose dominion over the ancient world was marked by great primitive works of sanitation, by grand storage reservoirs and aqueducts for the distribution of pure water, by public baths, and by cloaca for the maintenance of the health of cities. Now that Italy is restored as a kingdom, it is to be hoped that she will be restored to her ancient power by such works, which barbarism has destroyed, and ignorance and sloth have left in ruins! We have had the acknowledgment made by our Premier that the study of the public health is the first duty of a statesman. I can bear witness that Italy's great statesman, Cavour, had an advanced perception of that duty, manifested by immediate action on his appointment as Minister of Public Works, that he came over to England and did me the honour to pay me a visit at the first general Board of Health to learn what we were doing, when I entered into communication with him which unhappily was cut short by his removal by political convulsions and by war. Let us hope that statesmanship in Italy has not died in him, but that peace and unity will allow it to be applied to the revival of her pristine relative condition in the world of health and productive force. I apprehend that an accident has prevented the attendance as our guest of a physician of the Court of Germany, where I know special interest is taken in the subject by the daughter of our Queen; and where in Berlin, great works that I may attest to be sound in sanitary principle are in progress. Spain, too, puts in her appearance by eminent physicians who honour the occasion as our guests. Gentlemen, these collective delegations of physicians of the highest position denote the progress of a great change for the benefit of humanity when we see those distinguished minds which have successfully applied, to the practical application of curative science, the only science they were taught in their colleges, now being turned in all countries to the cultivation and to the promotion of the new science of sanitation; to the new science of prevention, which we are trying to advance by a degree-giving institution. For the future, the prescriptions of the sanitary physician will have to be given not to the *pharmacien*, or the apothecary, but to the builder, the architect, or the engineer. Of the important class of specialists in the new science of sanitation by works, we have present delegations of sanitary engineers, who have made good their pretensions by successful works, which in some important specialities they have come not to learn, but to teach. The service of sanitation in works will have to be achieved by improvements in details; in which the great will often be found in the little, in things for dealing with conditions that are not merely unattractive but repulsive to high-seated ignorance and apathy. I am happy to have near me, as one of our present guests, M. Charles Joly, the author of the most correct and complete treatise I know of on warming and ventilation, and the inventor of what I believe is the best form of domestic open fireplace, which ventilates by warmed air and by the removal of vitiated air. Of our own countrymen we have here a sanitary engineer, Mr. Rogers Field, who, for the sanitation of villages and isolated mansions, has invented a self-acting apparatus, or flushing tank, for the immediate removal of all the putrescible matter before it can enter into noxious stages of decomposition, and its transference through permeable drains beneath the soil for vegetable production. We have here, too, Colonel Waring, the most advanced sanitary engineer I know of in the United States of America, who has successfully applied there Mr. Field's invention, which, in fact, applies to villages and mansions the arterial and venous system, which it has been a great object of mine to promote the application of to cities, of bringing in pure water, and carrying in a constant supply to every house, and of carrying away, by a connected apparatus constantly, and without stagnation and probable decomposition, all fæcal matter by water carriage, and all putrid water, and immediately applying it to the land for agricultural production. We are glad to see here also, a member of our Council, Dr. De Chaumont, the physician of the Netley Hospital, a centre of army sanitation, who has done good work in the specialities of ventilation, and is the worthy successor of the late lamented Dr. Parkes, the author of the first dictionary on the public health. Gentlemen delegates, it is my duty to greet you one and all as our guests. Time does not permit me the gratification I had wished, of calling upon the delegates of each nationality for an expression of their sentiments, but I expect that I may presume upon your sanction in formulating an expression of our thanks to the French Government, and to the French managers of the Congress, for bringing us together, for the way in which we have been received and treated, and for the excellent manner in which they have conducted the business of the Congress.

Warm thanks were given to the Chairman, and expressions of regard to him as the *Doyen* of sanitation.

A MUSEUM OF DECORATIVE ART IN PARIS.

On the 19th of August there was opened, in the Pavilion of Flora, in the Tuileries, "The Museum of Decorative Art." Mr. Cunliffe Owen, C.B., and Sir Richard Wallace are named honorary presidents. The prospectus of the association testifies to the fact that foreign nations, more particularly England, Austria, Belgium, and America, have made extraordinary progress in decorative art, as illustrated by the contributions of these nations to the French Universal Exhibition of 1878. It then proceeds to state that:—

"It is time for us to study with the same ardour as our rivals a vital question which interests the material prosperity of our country. We possess, thanks to our innate taste, a superiority which must insensibly be lost if we fail to occupy ourselves with the development of the favourable circumstances created by art traditions among our artists, manufacturers, and amateurs."

The French presidents of the association are the Duke d'Audiffret-Pasquier, the Marquis de Chennevrières, the Duke Chaulnes, the Viscount de Ganay, the Prefect of the Seine, &c. The subscriptions already obtained towards the objects of the association amount to upwards of 130,000 fr. The opening ceremony was attended by some of the leading notabilities in Paris connected with the useful arts in the character of amateurs and patrons. The Museum is at present in a very incomplete condition; in fact, just now there are only four rooms occupied with pictures of ancient and modern artists. There are, however, cases for the reception of decorative objects of every description. It is the intention of the association to gather together, by purchase and voluntary contribution, objects that may serve as an educating medium for the artisan.

The Nailmakers' Strike.—Failing in an endeavour to compromise the serious disputes between the Staffordshire nailmakers and the 24,000 operatives now on strike, both parties are now acting defiantly, and ignore conciliation. There are symptoms, nevertheless, of the approach of better feelings.

NATIONAL ASSOCIATION OF MASTER BUILDERS.

The half-yearly report of the council of this Association has just been issued. The following is a summary. The report commenced by giving a list of towns the Master Builders' Associations of which had affiliated themselves with the national organisation. They were as follows:—Altrincham, Bradford Builders' and Bradford Stonemasons' Associations, Birmingham, Bolton (Master Joiners' Association), Bristol, Crewe, Cambridge, Chichester, Coventry, Croydon, Dudley, Derby, Doncaster, Eccles, Central Association of Master Builders of London, Lincoln, Leicester, Liverpool, Leeds, Lancaster, Manchester and Salford, Macclesfield, Northampton, Newport (Mon.), Norwich, Nottingham, Nottingham Master Plumbers' Association, Runcorn, Southport, St. Helen's, Warrington, Wolverhampton, Wigan, and Walsall. One of the first efforts of the organisation was to collect statistical returns from various centres of industry as to the rate of wages and the number of hours worked, together with the condition of the labour market. A second return of a similar nature was made in July, and this had proved a great boon to the trade in the settlement of disputes with the operatives. A list of several towns is then given, with particulars of the operatives' demands, and the masters' action in each. The Council then continued by remarking that there were still many towns where local associations already in existence could not see their way up to the present time to affiliate themselves with the national association. The principal of them were Bath, Burslem, Chester, Cardiff, Hull, Preston, Plymouth, Portsmouth, Sheffield, Stockport, and Sunderland, but they were quite willing to give all information in their power when required by the organisation. Union was very important, and the report urged builders to do what they could to induce unattached societies to give in their allegiance. The association had been the means of forming local associations at Derby, Macclesfield, and Eccles; and there was little doubt it had tended to check the demands of the operatives throughout the kingdom. In Liverpool, where the largest strike in the building trade had occurred this year with the painters, the secretary of the Operative Painters' Alliance Society, sought for a deputation to be received from the operatives to arrange the terms, and put an end to the strike, and he was informed by the chairman that the men could apply for work, and as many as were wanted would be employed. To this he complained that wherever the men had applied for work in other towns, they found that no Liverpool painters were taken on. The men returned to work on the following Monday morning. The National Association had recommended the local associations to petition the House of Commons through the members of Parliament for their respective towns, against a Bill to amend the law relating to the liability of employers for injuries negligently caused to persons in their employ. The treasurer presented his accounts, showing the amount of subscriptions received for the year was 228*l.* 3s. 1d. Of this, 76*l.* 2s. 6d. had been expended, and 152*l.* 0s. 7d. were therefore left in the bank. When the secretary's salary and other disbursements were paid, a net balance of 66*l.* 8s. 6d. would be left to the credit of the Association.

The plasterers' strike in Bristol still continues, the men having demanded an increase of 1d. per hour. The employers, however, are fast filling their shops at the old rate.

CASE UNDER METROPOLITAN BUILDING ACT.

At Marlborough-street, Mr. Paul Vargues, of Leicester-square, hotel keeper, was summoned by Mr. Walker, district surveyor of St. Martin-in-the-Fields, for neglecting to give two days' notice before the commencement of building works.

Mr. Walker said he was compelled to take proceedings in order to remove the prolific source of danger arising from the laxity of builders and owners in neglecting to give notice as required, thus avoiding scientific supervision. He did not want to press heavily against Mr. Vargues, as he believed the neglect was caused by Mr. Vargues's absence from home at the time. The work done was of an important nature, for which the Metropolitan Board of Works had laid down stringent regulations.

Mr. Vargues stated that he had given directions to his builder to open a communication from the rear of his hotel to an adjoining house, but was quite ignorant of the requirements of the Act at the time.

Mr. Mansfield ordered him to pay 20s. fine and 12s. costs.

THE DECORATION OF ST. PAUL'S.

Sir,—"Meter," in endeavouring to set me right upon the subject of "shams," has himself fallen into a most egregious error. To the main principles laid down in my previous communication I must still adhere, notwithstanding that "Meter" doubts my ability to understand that "fine art is essentially shamming." He says, "*We* had really begun to hope that this notion respecting shams was on the wane, and that people, especially writers on Art, were beginning to see that Art for the most part consists in shamming nature." This is a proposition which I never remember to have seen seriously advanced before. Art in its proper and legitimate sphere is the very antithesis of shamming. Fine art is no more a sham than Nature herself. A sham is essentially a delusion, something "which deceives expectation," and consequently shocks the understanding. A sham pretends to be what it is not, and is perpetrated to deceive. Neither a painting nor a statue can be consistently classed in the category of impositions. The very best compositions in art are always the farthest removed from any attempt to deceive the spectators by an endeavour to ape reality. Art legitimately employed is ever truthful, and the greatest painters have invariabiy deprecated the idea of shamming nature so as to deceive. The most meretricious works always aim at deception. I have a religious and deep-rooted hatred of "shams," and unlike "Meter," should be truly sorry to see the agitation against them "on the wane." If "Meter" will compare our present art productions in all branches of manufacture with those of previous years, he will have cause to speak well of, and be thankful for, the crusade against shams. To call fine art "shamming" is to libel our greatest intellects. A sham is an endeavour to lie, and the logical conclusion is that, according to "Meter," all painters, sculptors, and modellers are artistic fabricators of falsehoods.

James Geo. Buckle.

Sir,—"Meter's" arguments tend to depreciate Stevens's sketch, and are doubtless designed either to wantonly impede its execution, or altogether to prevent it from being carried out. Why should the merits of a deceased artist, or of his works, be called in question? Although not very widely known, Stevens's talents have been recognised, nay, highly lauded, by that section of the press which is supposed to favour the aspirations and style of the New School. Is this not enough? How much longer is the commencement of the decoration of St. Paul's to be delayed by factious opposition? If the highest authorities upon mural decoration in this country have been consulted,—I say "if," for I am by no means in the position to say that they have,—why let the demolition of Thornhill's old-fashioned work be proceeded with, and restoration, under Messrs. Leighton & Poynter, commenced forthwith. Does "Meter" desire that the fund subscribed for the work should double itself at compound interest before the work is commenced?

Civis.

CONCRETE HOUSES.

Sir,—I wish to get information in regard to the building of concrete houses. The Duke of Sutherland is desirous of extending his reclamations in the centre of Sutherland, where there is a difficulty of getting skilled labour, and it has been suggested that the houses might be constructed entirely of concrete, including the floors, walls, partitions, and roofs.

I will feel obliged if any of your correspondents can give us any information whether or not this is practicable, or whether it would be more expensive than the ordinary method of erecting houses. There is plenty of clean sand and gravel to be got from the burns in the neighbourhood.

G. G.

*** Certainly it is practicable, and would probably be less expensive than the ordinary method. The undertaking would require, however, to be rightly directed.

COMPLAINT AGAINST A BUILDING CONTRACTOR.

Acting on the part of the Working Men's Club and Institute Union, Mr. Edward Hall says he had arranged for a visit to the Natural History Museum, South Kensington, with the concurrence of the architect, the clerk of works, and the contractors' manager, and complains bitterly that, after the bills and cards of admission had been printed, the visit was forbidden, with scant courtesy, by Mr. Markwick, partner in the firm of Messrs. George Baker & Co., the contractors. The act is to be regretted; but whether or not Mr. Markwick has a valid defence of the course he took we are not in a position to say.

OPEN-MOUTHED PIPES *v.* VENTILATORS.

Sir,—At page 896, Mr. Banner states that I ought to have mentioned the conditions under which the experiments were made as described in your previous week's issue, p. 869. With your permission I shall now do so. They were made with a 4-in. pipe carried up from the centre of my house in the upper flat. The entrance-door and all the windows were shut, except that four windows had each an opening in the middle all the way across about 1 in. wide to admit fresh air, and there was only one fire on. These circumstances, and the condition of the atmosphere, caused a natural up-current in the ventilating-pipe all the time I was experimenting. Upon August 22nd, at 8 p.m., the weather changed, and in two minutes the following was the result:—

Plain 4-in. Pipe.	Trumpet Outlet.
75 ft. up.	580 ft. up.
110 ft. down.	15 ft. down.

The anemometer I have used is a new 3-in. one, and the bottom or inlet of the 4-in. pipe was contracted to fit it. The experiments described at p. 869 were made when there was little wind, and it is due to Mr. Banner to publish the following results when the wind blew harder. Each ventilator and the plain pipes got four minutes and the whole amount of up-current of each was as follows, in feet:—

Plain Pipe.	Trumpet Mouth.	Boyle's Ventilator for 3-in. Pipe.	Buchan's 4-in. fixed Ventilator.	Banner's 3-in. Cowl.
800	1,400	1,200	1,960	1,350

In this case, Mr. Banner's cowl acted much better than the plain pipe, as it had the *necessary motive power* in the high wind to make it work, but during a calm this motive power is wanting,* hence its formation and its narrow outlet cause it to give inferior results.

It is somewhat amusing to read the comparison drawn by Mr. Banner, at page 896, between his own 3-inch cowl and Mr. Boyle's fixed ventilator, and in which he takes care to tell us that the outlet area of the latter is much greater than that of the former; but as each is what the patentee sells as his size for a 3-in. pipe, Mr. Banner has himself only to blame if he makes the outlet area of his own cowl too small.

Mr. Banner is also displeased at the results stated in regard to his cowl not being so uniform as the others; but I cannot help the cowl in that respect, for, owing to the way it is balanced, it is somewhat erratic in its action, and thinks nothing of taking a waltz occasionally.

To-day I tried a new and different experiment, viz., to test the value of the ventilators in preventing a blow-down, or suck-down, of air through the ventilating shaft. I only allowed about half the former amount of fresh air to come into the house, and had two fires on, and the following are the results in feet of up-current and down-draught in one minute for each:—

	Plain Pipe.	Trumpet Mouth.	Boyle's Ventilator.	Buchan's Ventilator.	Banner's Cowl.
Up	30	200	160	250	100
Down ...	40	25	10	none	5

The conclusions to be derived from the foregoing experiments I consider are that a plain pipe is much inferior to one with a trumpet-mouthed outlet, while the trumpet-mouth is at least equal to various ventilators, and in some cases is superior,—the situation and purpose having a good deal to do with which would be most suitable. While as to preventing "down-draught" into a house or enclosure with fires on in it, &c., which would tend to draw in a current from the outer air, a plain pipe is far behind a pipe with some suitable appliance surmounting it.

W. P. Buchan.

COWL EXPERIMENTS.

Sir,—Mr. Banner has thought proper in your last issue to submit for publication a tabular statement purporting to be "Results attained by the Metropolitan Board of Works" of certain tests or experiments conducted for gauging the power of various ventilator extracting cowls, and wherein it is made to appear that my Patent Exhaust Ventilator yielded negative results, and that his cowl was the best amongst the appliances tried.

Will you allow me to place on record that the Metropolitan Board of Works are in no way responsible for his statement: it has not emanated from them, and is given without their authority. They repudiate it; and, further, the executive engineer of the Board declares that Mr. Banner's cowl is incapable of performing useful service as an air-extractor, and that it is inferior in its effect to even a common lobster-back cowl.

Mr. Banner has recently applied to the Metropolitan Board of Works for a copy of the tests furnished by the Board's engineer upon the action of his cowls. I am enabled to state for your information that the Board has declined to accede to Mr. Banner's request, the papers in question being confidential; but he was officially supplied by letter, dated the 30th July last, with a copy of the committee's report relative to the subject of experiments.

I have the honour herewith to furnish a copy of the report referred to, which is an extract from the minutes of proceedings of the Metropolitan Board of Works, from which it may be observed that the opinion of the executive is recorded of the little value attached by them to Mr. Banner's appliances.

The tabular statement prepared by Mr. Banner, to which he has unwarrantably attached the Board's name, is deceptive, and garbled in such a way as to entirely mislead the reader. The figures quoted are dressed to show the results of certain fractional periods, and not of the total duration of time of experiments, and are selected for his purpose of snatching an apparent advantage which he does not possess.

For example, in an observation lasting 175 minutes, Mr. Banner selects two periods, each of one minute and of five minutes' duration. It is impossible that the several extractors could be used at the one time upon the same tube and under similar conditions, and it is to be inferred, therefore, from Mr. Banner's tables that he has selected the periods of *maximum force* of the wind to illustrate the action of his cowl, and pitted them against periods of *minimum force* of the wind of my patent exhaust ventilator.

The essentials of a good extracting ventilator to be commended for general service is not speed alone, for that is merely a factor; but power, economy of cost, freedom from down-draught, capacity, permanence, and durability,—features now generally recognised as not possessed by Mr. Banner's appliances.

Richard Weaver, C.E.

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* Consequently, it is scarcely a proper comparison to class a ventilating cowl and a Giffard injector together, seeing that in the latter case the engineer can apply the steam whenever he pleases.

WILLIS'S ROOMS.

Sir,—Can you tell me what is the peculiar construction of the floor of rooms in King-street, St. James's (Willis's Rooms)? I understand they are the best rooms in London for dancing,—and I have an order to construct a floor precisely similar. If you can let me have any particulars respecting its construction you will greatly oblige, yours faithfully,

H. A. Y.

*** It is a double-framed floor including girders, ceiling-joists and floor-joists, but the proprietors are not aware of any peculiarities in the construction. Originally it was wholly of wood, and there was a row of uprights, disguised as palm-trees, under the centre of it in the room below, which in the times of Almack was called "The Palm-tree Walk," where visitors waited for their carriages. A few years ago iron girders were introduced in lieu of some of the wood girders, and the "palm-trees" were removed. The rooms as originally built were opened in February, 1765. Mr. Robert Mylne was the architect.

PASTE.

Sir,—Response has frequently been given in your pages to the inquiry,—"How to make paste that will keep." Judging from my experience, however, any sufficient answer has yet to be published. I have had additions of each substance that I have seen recommended,—as alum, oil of cloves, &c., but not one of them answers the purpose. Gum is not very suitable for large surfaces; and it gets mouldy in the bottle. The paste that I have found both the least liable to speedy putrescence, and by far the most stickable, and which is brownish in colour, is sold at a certain shop for shoemakers' implements in Rochester-row, where a powder of which it is made could be had when the shopkeeper is in good humour. I believe I have been told that the powder is not dextrine. Paste that is very good, and like what is ordinarily called shoemaker's paste, can be had at a similar shop in Chapel-street, Westminster. It is too thick. It can be diluted; but then I think it acquires the objectionable properties of ordinary paste. What one wants is, with materials at hand, and wherever one is, to be able to make oneself, unputrescible as well as stickable paste, or some sufficient and cheap substitute for it; and if the paste contained an ingredient whereby the pasted papers would be distasteful to mice, there would be some loss of valuable documents prevented for such men as

An Old Literary Man.

BUILDING ACCIDENTS.

Kennington.—On Monday last a shocking accident, resulting in serious injuries to a man named Edward Michael, aged twenty-nine years, residing at 29, Whitloe-street, King's-cross, occurred at Kennington. It appears the man was employed on a scaffold with other men pointing the front of Manor House, Kennington, when a heavy crash was heard, and Michael was discovered lying on the stones with a frightful gash across his left temple, and his upper lip split up to the nasal bone. On his removal to St. Thomas's Hospital he was attended by Mr. Bowen, who found that he was otherwise fearfully injured.

Northumberland-avenue.—On Monday afternoon a serious accident occurred at the works going on in connexion with the hotel which is being built at the Strand corner of Northumberland-avenue. An iron girder was being hoisted, when the guide-rope broke, and one of the workmen lost his hold and fell, sustaining such injuries as to make it necessary that he should be conveyed to Charing-cross Hospital.

Swedish Timber.—We have received a copy of the official "List of Saw Mill Owners and Timber Exporters of Sweden, with their Shipping Marks on Sawn Timber," just issued by the Society of Saw Mill Owners and Timber Exporters at Stockholm. It is sold at the *Timber Trades' Journal* Office. The length of the list would astonish many.

THE BLACKNESS OF ST. PAUL'S.

The criticisms of Professor Paley and Mr. E. C. Robins in reference to the above have opened up a wide field for inquiry and research as to the action of the atmosphere upon the surface of stone-built churches, particularly in our large towns and cities.

I am pleased to be able to endorse Mr. Robins's views when he states in your last week's impression "that the sooty coating on surface has been a preservative to the stone." Being at present engaged on the restoration of the steeple to the parish church of St. John's, Horselydown, Southwark, which is built of Portland stone, I find there are many portions of the facing stone covered with this black sooty-like coating, which certainly appears to have preserved the face of the stone from decay, as is clearly shown by other courses around them when not so covered being considerably disintegrated upon their surfaces, whereas the black-faced stones have not changed or decayed, but their surfaces remain in many cases about ½-in. or more before the face of adjoining stonework. They are not confined to any particular side or aspect, but may be seen on all sides,—north, east, south, and west,—and of the walls of the church generally also.

Upon breaking off small portions of the black-faced stones they appeared to be some degree softer, and not to contain the same quantity of silica as the others, where the face of the stones had been disintegrated or decayed. I would venture to hazard the opinion that it is either a different stone, perhaps Aubigny, or that it is Portland, but not set on its proper bed. Here, then, is offered a chance of easily inspecting the stone to Mr. Robins, or those who may wish to follow up so interesting a subject as the preservation or decay of stonework, or if any geologist or chemist has sufficient interest to do so, he has now an opportunity of studying and analysing it also.

I will just mention that the above church is faced apparently with Portland stone throughout, and was consecrated in the year 1733.

Arthur Billing, Architect.

"CONDITION OF TENBY."

Sir,—In your issue of August 24th there appears a letter from Mr. W. Burns reflecting on the sanitary condition of Tenby. A reply to this will be forwarded to you, but in the meantime it may not be amiss to show the animus in the letter, by stating that Mr. Burns was employed in connexion with the waterworks here; but after his services were dispensed with, he preferred a claim on the Sanitary Authority which was considered unjust and accordingly resisted. Arbitration was agreed upon, and the award has been made these two years, but Mr. Burns has not sufficient confidence in the justice of his cause to take it up.

In connexion with this, some of your readers may possibly remember Mr. Burns, about three years since, sending a letter to the editor, making some charges against the corporation. This letter the editor declined to publish, and stated in a paragraph, as well as I can recollect,—"That if the charges were true Mr. Burns had his remedy elsewhere; and if not true, they were better unpublished."

H. T. Morley, Borough Surveyor, Tenby.

FALL OF AN ARCH IN THE CITY.

An inquest was opened on Wednesday before Mr. Payne, at St. Bartholomew's Hospital, on the bodies of Thomas Joseph Higgins, 43, and George Colley, 29, labourers, who were killed by the fall of an archway at Alderman's-walk, Bishopsgate, on Saturday last. From the evidence it appeared that the men were in the employment of Messrs. Brass, builders. On Saturday there was a very heavy thunderstorm, and the deceased men were compelled to seek shelter from the rain more than once. An archway was being constructed, on the top of which was a large quantity of ballast, and this had been added to in weight by the heavy rain which had fallen.

George Kerry, carpenter, gave evidence to the effect that the arch was resting on solid brickwork, and that the ballast was shot on the top of the arch from wheel-barrows. The rain was sufficient to shift the ballast or anything else which was in the way of its progress. He attributed the fall of the work to a sudden shock caused by the vibration arising from a clap of thunder. One of the supporting walls bulged out. He believed that the walls and the arch were properly made, and would have stood firm had it not been for the storm.

George Turner, foreman, considered that the archway fell in consequence of a flash of lightning striking an iron girder opposite, passing through the column supporting it on the wall, and striking the wall, drew it away from the arch.

George Williams, labourer, said he believed the archway would have stood had it not been for the large amount of the ballast. The archway was only supported by temporary rests, and he considered there was not sufficient timber underneath to sustain the heavy weight of the ballast, and the rain which saturated it. The ballast was about eight or nine tons in weight, and it was put on the archway about one hour before it fell. The ballast was placed there for the purpose of concreting.

The inquiry was adjourned.

COMPETITIONS.

Truro Cathedral. — The Executive Committee of the Fund for erecting a cathedral at Truro, after examining the drawings sent in by Messrs. St. Aubyn, Bodley & Garner, Burges, Pearson, Pullan, and J. O. Scott, have selected Mr. Pearson, of London, as the architect. Mr. Bodley was second in the voting.

St. Luke's Church, Southport.—Out of five sets of drawings submitted in competition for the above church, those under motto "Mediæval" were selected, the authors being Messrs. Mellor & Sutton, architects, Southport. The church is to be faced with bricks inside and outside.

WATER SUPPLY.

Glasgow.—At a meeting of the sub-committee, appointed by the Glasgow Water Commissioners on district meters, the engineer (Mr. Gale) submitted the results of the system of night inspection, and of control over the water-supply, as carried out in the six experimental districts of the city. The aggregate population of this area is 60,096, and at the time controlling meters were introduced the average daily supply per head was 53·1 gallons, and the night rate, per 24 hours, 42·2 gallons. The results at the 6th of June last showed that the daily supply per head had been reduced to 33·7 gallons, and the night rate per 24 hours to 19·5 gallons. In one district, where it formerly was 60 gallons per head, the reduction per night was as much as 41 gallons. The average saving over the whole district (population 60,096) was 17·8 gallons per head, or an aggregate of 1,069,709 gallons per 24 hours.

Kilmalcolm.—The new waterworks for the village of Kilmalcolm and its neighbourhood were opened on the 15th of August, by Sir Michael Shaw-Stewart. The supply is drawn from the Blacketty Burn, which is situated on the ducal estate of Sir Michael R. Shaw-Stewart. A reservoir has here been formed by the construction of an embankment, about 400 ft. in length, across the valley. The area of the reservoir is nearly two acres, the depth of water 14 ft., the water surface about 50,000 square feet, and the capacity of the lake a million and a half gallons. This is estimated to give a supply of thirty gallons per day per head over the population in the area of supply. The water is supplied to Kilmalcolm by gravitation, the height of the reservoir above the town being 170 ft., and above the sea-level 465 ft. The cost of the undertaking has been nearly 3,000*l.* Mr. Wilson, C.E., Greenock, has superintended the progress of the works, and the several contractors are:—For the reservoir, filter, and supply-tank, Mr. Matthew Brodie, Gourock; pipe-laying, Mr. Daniel Cunningham, Kilbarchan; cast-iron pipes, Messrs. R. Laidlaw & Sons, Glasgow; valves and hydrants, the Glenfield Company, Kilmarnock.

Books Received.

Three Years in Roumania. By J. W. Ozanne. London: Chapman & Hall. 1878.

Roumania being now a household word, many will be surprised to find that the little book before us is the first about the principality written in English by an Englishman. Mr. Ozanne lived there three years, from 1870, and his object has been to give a general idea of the country and the people without going too much into detail. When he wrote, Bucharest, which name in the native tongue means "the City of Pleasure," had about 200 churches, 25,000 houses, and a population of 244,000. The state of society, as described by the writer, is loose and immoral in the extreme, and does not lead to great expectation of progress, unless a change is being effected in that direction.

Roumania is divided into thirty-three districts and 164 *arrondissements*. Turnu-Severin is the chief town of the Méhédintii district, and is one of the principal Danube ports. It was once upon a time the capital of Little Wallachia, and now possesses a dockyard for the repair of the Danube boats. In this town are to be traced the ruins of a Roman tower and the remains of a Roman bridge. In the district of Argès is the church of Argès, which has attained a European celebrity. Mr. Ozanne says this church was built in 1518, in the Byzantine style, and is of extreme beauty. Its exterior is of marble, carved with remarkable skill, and producing a marvellous *tout ensemble*. The church is built in the form of a square, after the manner of the Greek churches, and has a dome in the centre. There are four little towers of great elegance at the four corners of the monument, and two of them seem about to fall one on the other. The illusion is produced by spiral bands which, encircling them from base to capital, make them look as if they were oblique, although they are in reality quite perpendicular. The walls of the interior are embellished with fresco paintings and gilded carvings. The name of the architect, Manoli, has been preserved in the popular legends, in which the Devil naturally plays a prominent part.

The book will be found very agreeable reading.

Rock-cut Phrygian Inscriptions at Doganlu.

An important paper on this subject, by Mr. Edward Thomas, F.R.S., appears in the current number of the Journal of the Royal Asiatic Society. At the end Mr. Thomas gives "for the exercise of other people's experimental criticism," as good a combined transcript of the inscriptions (reduced into small Greek) as he can obtain from the mechanical eye-copies at present available.

VARIORUM.

The current number of *The Magazine of Art*, includes a thoughtful and eloquent paper by Mr. Wyke Bayliss, F.S.A., named "The Higher Life in Art." Take a specimen,—"Because art cannot do everything it is unreasonable to conclude that it can do nothing. This, at least, it can do. It can so transfigure a little colour that lies inert upon the palette,—a little grey, and brown, and white,—into a living presence, that our hearts shall beat faster only to look upon it. It can so link thought with thought, and put them into grave or sweet words, that we may look through Shakspeare's eyes upon an English garden of 300 years ago,—or hear the storm-shaken pines which make music in the Volkslied,—or see the shadow that lay dark on Dante's life as lies the shadow of the cypresses upon his grave at Ravenna. It can so build stone upon stone, and shape them into beauty, that Richard of Salisbury of the thirteenth century, shall speak to Charles Kingsley of the nineteenth, making him stronger for his duty, and happier in performing it. And the force which can do these things is surely one of which it is well for us to take account. Nor is this all; for, whatever art can or cannot do, it is quite certain that *we* cannot so much as live our lives without it, any more than the bees can build their cells without the fine instinct which controls their labour,—only we sometimes go wrong, while they always go right. It is a question of degree. Whether we build well or ill,—we build. Every picture that the artist paints or the merchant hangs upon his walls, every statue we set up in our midst, every book we read, every song we sing, as surely as every roof-tree that shelters a hearthstone, is a chamber in the great palace of art in which some soul shall for a time dwell. Let us see to it that the chambers are at least clean and full of light. Such chambers have been built by those who came before us. Salisbury Cathedral is one of them. And there has been one also, for centuries, in every village in England where an ivied tower or a simple chancel arch has touched the hearts of priest and squire and people with a sense of beauty even when they least knew it."——Messrs. Bemrose have added to their Railway Panoramic Guides, one for the Glasgow and South-Western line, edited by Mr. R. Kemp Philp. These guides, for a few pence each, give travellers a very good notion of the country they are passing through, with much useful information pleasantly conveyed.

Miscellanea.

Alleged Frauds by a Local Official.—At a special sitting, the Edmonton magistrates have investigated five charges of fraud against Edward Clarke, an ex-member of the board of guardians, and still holding a number of local offices of trust. The prisoner was also charged with forgery. It appeared that Clarke, who was much respected by his fellow guardians, was trusted by them to superintend the building of a temporary small-pox hospital, on the strength of his having formerly been a builder and contractor. The erection was completed in the short space of fourteen days, and shortly afterwards prisoner presented a bill for timber in the name of James Smith, but without an address, for 347*l.* 7s. 10d. He was also a member of the finance committee, and in that capacity certified to the correctness of the account. A cheque was therefore drawn for the amount, and, at prisoner's solicitation, handed to him, he promising to obtain Mr. Smith's receipt. Eventually he presented a receipt, but in the name of "Joseph," and not James Smith, and his attention being drawn to the difference in names, he said Mr. Smith's son had inadvertently signed for his father, but that he (prisoner) would get a proper receipt. He took the Joseph Smith receipt away, and subsequently brought one in the name of James Smith. An explanation was asked for, and prisoner not being able to give a satisfactory account of the transaction, a searching inquiry was made, which resulted in the discovery that prisoner had only obtained timber to the amount of 243*l.* 10s. 11½d., and that he had made out the larger account by increasing the quantities actually supplied. Further investigations brought to light the fact that a similar process had been pursued with respect to drain pipes ordered by prisoner as a member of the Works Committee, and the evidence tended to show that he had committed several other frauds of a similar description. Eventually he was committed for trial on all the charges.

The Ancient Sipontus. — The city of Sipontus was founded in pre-historic times by a colony of Arcadians and Thessalians, who left the shores of the Peloponnesus to settle in Daunia, the third of the Ispigian regions. New Sipontus rose on the seashore, near Mount Garganus, by the two (now dried up) rivers Cerbalus and Daunus, the united waters of which formed the natural and safe harbour. Commander Stanislaus D'Aloe writes to the *Morning Post* claiming the credit of the discovery of the ancient city. He was led to it, it seems, by finding in what was supposed to be the cistern of the present cathedral an epigraph in archaic characters, which he reads thus in English:—"Titus Tremelius Antiochus, Libertus of Titus, undertook at his own expense the erection and dedication of the temple and altar of Diana, built of square stones adorned with plaster, and a statue of Diana. Thus he willingly and worthily fulfilled his vow." From the meaning of this epigraph he concluded that he was in the cell of the ancient temple of Diana Sipontina, and not in the cistern of the modern hermits, and in proceeding to examine it more in detail, found it to be very large, with a conical vault terminating in a round hole to admit the light. He afterwards began to excavate the adjoining ground, and uncovered the capitals of the columns of the portico in two parallel rows to the number of twenty. In the same month of July, continuing the investigations, he discovered at a distance of two kilomètres from the temple of Diana the public Ustrina of Sipontus, surrounded by a wall of reticulated masonry, and near it recognised ruined edifices destined to the use of the public functionaries charged with the cremation of the dead. Returning westward he discovered the quay or mole of the ancient port, now three kilomètres inland from the shore of the Adriatic. All these monuments will be described in the "History of Ancient Sipontus," which will shortly be completed.

Bangor Cathedral. — A pulpit made of Caen stone, erected from a design of the late Sir Gilbert Scott, and executed by Messrs. Cox & Son, Southampton-street, has been placed in Bangor Cathedral. It is intended as a memorial of the late Rev. Morris Williams, rector of Llanrhyddlad, Anglesey, a clergyman well known in the Principality. The panels illustrate the preaching of John the Baptist, and other scriptural subjects, and have been executed by Miss Bonham, a lady amateur.

Huts for Cyprus.—The *Norfolk Chronicle* says that within the last few days Messrs. Lucas Brothers, of Lowestoft, have received orders to prepare with great despatch a number of officers' hats, &c., for Cyprus. The contract was as follows:—Eighteen huts for eight officers and eight men, each separate and private, and yet connected, 60 ft. long, 18 ft. wide, and 9 ft. high; three officers' mess establishments, 116 ft. long, 18 ft. wide, with an ante-room 36 ft. long, 18 ft. wide, averaging 9 ft. high; three guard-houses, 42 ft. long, 17 ft. wide, and 9 ft. high: this building to contain prisoners' room, 16 ft. 6 in. by 15 ft.; a guard-room, 21 ft. by 16 ft. 6 in.; three cells for prisoners, 12 ft. by 6 ft. each, lined with corrugated iron, and planned upon the separate system. The contract was signed on the afternoon of the 3rd of August, and the order was received at Lowestoft on the 5th at midday, and on the 17th the officers' huts were ready, waiting the inspection of the Government inspector. The mess establishments were expected to be finished on Monday night, and the whole affair completed by Thursday at the latest, or in sixteen days from the time the order was first given, Sundays excepted. The whole was completed by machinery, not a tool being employed from the time the timber was landed at the wharf until the huts were ready for delivery, and then they were simply slightly nailed in position. The whole will be shipped and delivered at Woolwich within twenty days from the time the order was received.

Playgrounds and Open Spaces. — Dr. Septimus Gibbon, medical officer of health for the Holborn district, in his annual report to the Holborn Board of Works, states:—Ever since I have been your medical officer of health, I have frequently stated in my reports that one of the most important sanitary wants of the central districts of the metropolis is the provision of playgrounds and recreation grounds where the aged, the invalid, and the young can take air and exercise in safety. For this beneficent purpose I have urged the throwing open of three disused burial-grounds in the district some six acres in extent: they would make admirable gardens or recreation grounds. Many of the churchyards and burial-grounds of the adjoining parishes have been consecrated anew to this divine mission of "healing the sick." I trust, therefore, that your Board, notwithstanding numerous past failures, may be encouraged to make one more effort to have these disgracefully-neglected grounds cleared, beautified, and thrown open to the public as recreation-grounds.

Bye Commissions.—"They manage these things better in France." An important verdict has just been given by the Paris Court of Criminal Appeals concerning the question of commissions given to servants by dealers. The principal accused, Hinze, was a clerk of the Northern Railway Company, and was entrusted with the purchase of certain stores. He was charged with having concerted with certain dealers to procure for them orders, on which they allowed him a bonus of three, four, or five per cent. He thus received a total sum of about 100,000 francs. To obtain for them the preference he dissimulated the lower prices at which the same articles were offered by other firms. Hinze was condemned to three months' imprisonment, and 11 tradesmen were sentenced each to one year's detention.

A New Sailors' Home at Liverpool.—On the 22nd ult. Lord Sandon opened the branch Sailors' Home at North-End, Liverpool. The building (of which we gave a view and plans in our volume for 1876 (pp. 1,242-43), occupies a site in Luton-street, off Great Howard-street, and is advantageously situated for seamen whose vessels may be in the North-end Docks. The style of architecture is Gothic, freely treated to meet the exceptional requirements of the building. The total cost of land and house-property was 10,149*l.* 14s. 10d., and the cost of the new home and its fittings about 15,000*l.*, making the total cost about 25,150*l.* The architects were Messrs. Houet & Wise, and the contractors Messrs. Jones & Son.

The Bishop's Throne, Salisbury Cathedral.—The new episcopal throne has at length been placed in the choir of the cathedral. It is in the Early English style, is carved in oak, with a lofty pinnacled top or canopy, and makes a finish to the stalls on the southern side of the restored choir. It was designed by the late Sir Gilbert Scott, R.A., and was executed by Mr. Earp, of Lambeth, at a cost of 560*l.*

Viscount Falkland's Monument.—At a meeting of the Newbury District Field Club, on the 22nd ult., Mr. Money reported that the erection of the memorial to Viscount Falkland on the battle-field of Newbury, where that nobleman fell, was being satisfactorily carried out by Messrs. Freeman, of Westminster, and that the work would shortly be ready for inauguration. After the meeting, a party of members and ladies assembled on the site on Wash-common, when a high block of granite, weighing 11 tons, forming the base of the memorial, was lowered to its place, a bottle being deposited containing some coins of the realm and a document recording the circumstances under which the memorial was erected. The memorial, it appears, will be unveiled on the 9th inst.

Plymouth Theatre.—The Plymouth Town Council have resolved, after nearly four hours' debate, to rebuild the theatre, which was burnt down in June, and which was corporation property. The insurance policy was only 2,500*l.*, and a strong protest was raised against burdening the rates with the cost of additions and improvements, which, it was contended, were illegal. The legality, however, was maintained by the town-clerk, and the motion was passed, ten members of the council voting against it. As we have previously announced, Mr. C. J. Phipps will be the architect of the new building. We publish elsewhere the list of tenders for the work.

The late Mr. John Ashdown, of 33, Norfolk-street, Strand, architect and surveyor, died very suddenly after a short illness on Monday last. He was articled as a pupil to the late Sir Gilbert Scott, and was a member of the profession for upwards of thirty years. His principal works were the Lambeth Cemetery, the Orphan Working School at Haverstock-hill, Bridlington Quay, Milford Haven, the designing and laying out of the town of Llandudno; Dalby House, Leicestershire, &c. The deceased at his death held the appointments of surveyor to the Conservative Land Society and the United Land Company, and architect and surveyor to the Cadogan and Hans Place Estate, Limited.

Hexagonal Cottages, Seacombe.—The third annual distribution of prizes to the inhabitants of the hexagonal cottages at Seacombe has taken place, the prizes being given by the owner of the cottages, Mr. Ellis, as a means of interesting the cottagers in the cultivation of the gardens they hold. The gardens are, from the manner in which the cottages are built, much larger than those usually accompanying houses of that size and rental, more especially those so near to a great town. There are at present thirty-five of these cottages, comprising five blocks and a half, four blocks having been built during the past year.

Messrs. G. Wilson & Sons' Mortising Machine.—"What, another?" says the reader. "Yes, another," we reply; and it must be evident that the value of a good mortising-machine must now be largely recognised, or there would not be so many varieties placed before the public. Messrs. Wilson's is a hand-lever machine, and the lever, of wrought-iron, is brought directly over the chisel. Simplicity and cheapness are the grounds on which the patentees take their stand, and with some reason.

Prize Distribution, Paris Exhibition.—The Government are determined to render the occasion one of great interest, and the presidents of the juries now in Paris are convened to enter upon the arrangements. The Palais de l'Industrie, used in 1862, had been thought of as the place for the present distribution, but owing to the numbers likely to attend, the Government are in negotiation with the proprietors of the Hippodrome, capable of holding 6,000 persons, and in all respects suited for a grand spectacle.

The Proposed Conversion of the Paddington-street Burial-ground.—The special committee of the Paddington Vestry, to whom was referred the question of laying out the Paddington-street Burial-ground as a garden and recreation-ground, have reported against the proposal. The vestry declined to confirm the recommendation of the committee, and the matter stands over for further discussion on the Board reassembling after the recess.

The Joiners' Strike at Bolton. — The strike of joiners at Bolton has terminated, after four months' duration, by the unconditional surrender of the men to the masters' terms.

Memorial Pulpit, Shidfield.—A memorial pulpit for Shidfield church has just been executed by Mr. S. Newman, of Winchester, from the design of Messrs. Colson & Son, architects. It is intended for Shidfield new church, of which they are the architects. A memorial brass is to be fixed in a panel, stating that the pulpit is erected in memory of Samuel Wilberforce, late Bishop of this diocese; and of Thomas Vincent Fosbery, M.A., one of his chaplains, and sometime Vicar of St. Giles's, Reading.

Staffordshire Engineers at Lincoln.—The *Lincolnshire Chronicle* for August 23 contained an interesting account of the visit of the North Staffordshire Institute of Mining and Mechanical Engineers to the well-known engineering and agricultural implement works of Messrs. Robey & Co., Lincoln.

The Knox Memorial Institute.—The public ceremonial of laying the foundation-stone of this building at Haddington, by the Right Hon. the Earl of Haddington, is fixed to take place on this Saturday, the 31st of August. The architect is Mr. J. Starforth.

Leicester Drainage Works.—At the meeting of the Leicester Town Council on Tuesday, Mr. W. F. Clayton, of Smethwick, was unanimously appointed engineer to the new drainage and flood works, at a salary of 400*l.* per annum.

TENDERS

For the erection of shops and houses, numbered 137, 139, and 141, High-street, Poplar, for Mr. Thomas Rugg. Mr. E. C. Homer, architect:—

Staines & Son	£1,622 0 0
Boyce	1,577 0 0
Shurmur	1,485 0 0
Harper	1,475 0 0
Judd	1,397 0 0
Riddell	1,350 0 0
Alexander	1,349 0 0
Johnson	1,333 0 0
Sheffield & Prebble	1,287 0 0

For a new brick bridge, in lieu of the wooden structure known as Duckpool Bridge, on the road leading from Stixwould to Bucknall, for the Bardney Drainage Commissioners. Messrs. Padley & Thropp, engineers:—

Semper	£1,399 10 0
Walter & Hensman	935 0 0
Chapman	930 0 0
Binns	790 0 0
Hatchiffe & Bell (accepted)	727 0 0

For sewage outfall works, Oldbury, for the Local Board:—

Read & Jevons (accepted)	£4,638 12 0

For new workhouse schools at Marston Green, for the Birmingham Board of Guardians:—

Robinson (accepted)	£19,766 0 0

For the erection of a Wesleyan Chapel at Poole, Dorset. Mr. Charles Bell, architect. Quantities by Mr. H. Lovegrove:—

Tilsed	£5,590 0 0
Jones	5,551 0 0
Stroud	5,089 0 0
Jones	4,825 0 0
Hoare	4,800 0 0
Snow	4,740 0 0
Lawson	4,736 0 0
Stephens & Bastow	4,720 0 0
Honey	4,632 0 0
Williams	4,590 0 0
Griffin	4,050 0 0
Clarke (accepted)	3,957 0 0

For rebuilding Nos. 34 & 35, Barbican, E.C. Mr. Benjamin Tabberer, architect:—

Jarrett	£5,605 0 0
Downs	5,440 0 0
Brass	5,420 0 0
Browne & Robinson	5,380 0 0
Merritt & Ashby	5,349 0 0
Marks	5,334 0 0
Braid & Co.	5,264 0 0
Ashby, Bros.	5,185 0 0
Sabey & Son (accepted)	5,150 0 0

For a warehouse, Aldermanbury. Messrs. Ford & Hesketh, architects. Quantities not supplied:—

Crabb (accepted)	£2,965 0 0

For the reconstruction of the workhouse for the parishes of St. Giles and St. George, Bloomsbury. Messrs. Lee & Smith, architects:—

Dove, Bros.	£76,555 0 0
Brass	72,626 0 0
Conder	71,580 0 0
Browne & Robinson	71,464 0 0
Kirk & Randall	69,244 0 0
Reading	69,243 0 0
Cullum	68,190 0 0
Howard & Dorrell	67,742 0 0
Mowlem & Co.	67,435 0 0
Holland & Hannen	67,330 0 0
Clarke & Bracey	67,114 0 0
Downs & Co.	66,920 0 0
Braid & Co.	66,500 0 0
Crockett	64,969 0 0
Chappell	64,873 0 0
Wagner	64,786 0 0
Nightingale (accepted)	63,373 0 0
Vernon & Ewins	61,049 0 0

For lighting St. James's Concert Hall with sunlight-burners. Mr. Emden, architect:—

Way	£200 0 0
Allison	199 0 0
Strode	197 10 0
Lea (accepted)	175 10 0
Defries	165 10 0

For villa in Ashburnham-road, Clive Vale, Hastings, for Mr. H. Kidgell, of Wolverhampton. Mr. H. Plowman, architect:—

Ditch	£1,410 0 0
Taylor	1,252 15 0
Reeve	1,150 0 0
Vidler (accepted)	1,116 0 0

For alterations and additions to the Tulse Hill Hotel, Tulse Hill. Messrs. Wilson, Son, & Aldwinckle, architects:—

Saunders	£667 0 0
Cox	664 0 0
Macey	650 0 0
Gammon	590 0 0
Mailey	570 0 0
Taylor	567 0 0
Crook	528 0 0
Revised estimate:—	
Crook (accepted)	£445 0 0

For the construction of sewers in the Humber, Beaconsfield, and Mycenæ roads, Blackheath, Kent, for the West Combe Park Estate Company (Limited). Mr. W. Humber, engineer. Quantities by Messrs. Mann & Saunders:—

Gibson (accepted)	£4,954 6 6

For the erection of Heath House School, Horsmonden, Kent, for Mr. G. Tabor. Residence only. Contract No. 1. Mr. William Theobalds, architect. The proprietor supplies bricks and water, stoves and mantels, and paper. Reduced estimate:—

Martin (accepted)	£320 0 0

For rebuilding the Plymouth Theatre, for the proprietors, the Corporation of Plymouth. Mr. C. J. Phipps, architect:—

Berry	£9,093 0 0
Jones	8,150 0 0
Stephens & Bastow	7,599 0 0
Lapthorne & Good	7,334 0 0
Pethick, Bros.	6,978 0 0
Finch	6,675 0 0
Vernon & Ewins	6,490 0 0
Travena	6,370 0 0
Hubbard & Co.	6,292 0 0
McMillen	6,190 0 0
Clarke	5,784 0 0
Decorations and Gilding.	
Bell	520 0 0
Fouracre & Son	470 0 0

TO CORRESPONDENTS.

J. & M. C. (question is not remembered).—J. S. W. (the size of the rope is given as 27 in. = 2¼ in. nearly).—C. B. & Son (yes).—A. S. (under our mark).—D. A. R. (too late for present number. Next week).—Condition of Tenby (several letters on this subject reached us too late for our present issue. They will have attention. People who vilify should sign their names).—J. H. R.—H. G. H.—L. & S.—H. T. M.—P. & H.—"Tenby."—A Sufferer at Tenby.—E. B. F.—J. H.—M. & S.—S. M.—E. S. R.—E. C.—D.—J. F.—Messrs. R.—G. M. S.—W. F.—H. J. S.—A. & C. H.—W. H.—H. L.—B. T.—G. C. H.—S. & S.—Artist.—W. C. T.—E. W.—E. H.—J. J. H.—J. R.—R. & Sons.—W. T.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

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The apparatus consists of a drum with a double set of fans, which are worked by a fly-wheel placed in the centre, and on the same axle as fans. The motive for this fly-wheel is arrived at by a small jet of water being directed on to it, causing both the wheel and fans to revolve with great velocity; the air passing through the machine at a rate equal to 2,500 feet per minute, if desired, according to size of apparatus.
N.B.—The above machine may be used either as an exhauster or injector, as may be preferred, or both objects combined.
Also Patentees of the Fireclay Burners for Gas Fires and Cooking Purposes, and Patentees of the Tubular Gas Boiler for Baths and Conservatories, &c.
Designers and Manufacturers of Lamps and Candelabra.
Office and Works, 155, Queen's-road, Bayswater, W. [Advt.]

Helliwell Patent System of Air and Water-tight Glazing without Putty and without exposing any outside woodwork to paint, and New System of Covering Roofs.
The fasteners are brass or copper. The peculiar arrangement of the glass covers the whole of the woodwork, and only the small fastener is visible; therefore the Roof is indestructible and outside painting unnecessary. The squares of glass can be easily removed, and the whole taken out and cleaned by any inexperienced person. Breakage is impossible except through carelessness or accident.
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Extract from "Building News."
"Mr. T. W. Helliwell, of Brighouse, has recently patented and introduced a New System of Glazing and Covering Roofs, which is certainly superior to anything of the kind we have seen before; and it will, in our opinion, supersede any other system before the public."
Important References and all particulars from the Patentee,
T. W. HELLIWELL, Brighouse, Yorkshire;
And 19, Parliament-street, London.